Part Two

CHAPTER ONE

What is shortwave?

The shortwave bands on the home radio set are the means of bringing a multitude of overseas stations with their exciting programmes into your home every day. You have probably tuned your radio on to the shortwave sections, but you have then heard such a jumble of peculiar sounds and voices that you have given up without really understanding what these are all about.

Shortwave is very orderly, with the transmitting stations being given special conditions of operation. When you know these

This 1932 Airline Allwave Superhet was one of the first receivers with calibrated shortwave bands.

One of the early verifications from the ABC station at Pennant Hill, Sydney, the forerunner of Radio Australia.

conditions then you also know when to listen and where to tune in on your radio dial. It is my intention in this book to give to you that knowledge which, when coupled to your enthusiasm and patience, will enable you to be an armchair traveller in your own home. You will tune in to the world, be entertained, increase your geographical and social knowledge of many countries, and become familiar with foreign languages.

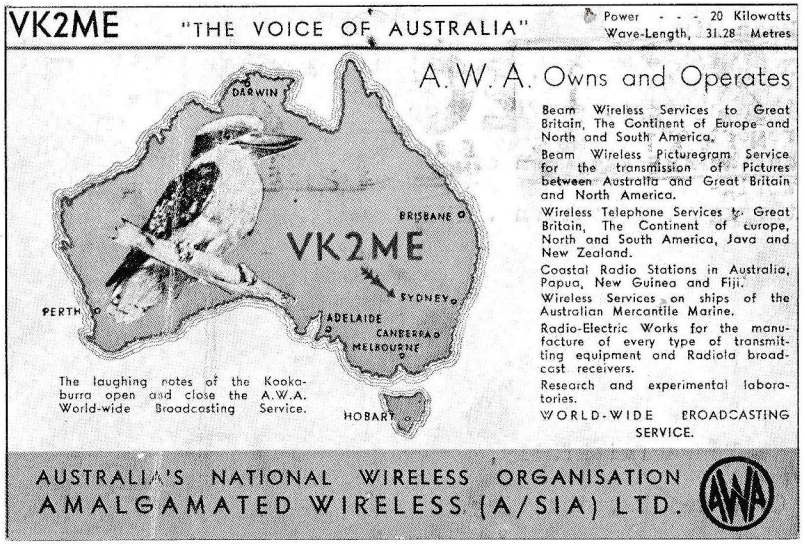
More than 40 countries are broadcasting to the South Pacific every day with programmes specially tailored for your listening. These are transmitted at times which will let you enjoy them in your leisure hours, and on frequencies which are likely to give you the best reception. If you are interested in the latest news, join the 70 million overseas listeners of the BBC and get world news as it happens. Sport may interest you, perhaps football from England or boxing from the United States. Such is the speed of radio you will hear the commentator before he is heard by the spectators at the venue, radio waves being many times faster than sound waves.

Patience: You will need patience. Take time to explore shortwave listening. On most home radio sets, the shortwave stations seem closer together on their part of the dial than are the local stations which families normally receive on the broadcast or medium-wave part of the dial. Domestic radios are designed this way, and slower tuning of the tuning knob is most essential. Many people have over the years purchased the very finest of domestic radio receivers only to find that shortwave listening seemed to them to be too complicated and frustrating with the result that few of them made progress. With patience, learning a little at a time, you can master radio listening and make it a fascinating hobby.

I started with a small 5-valve radio which had only two bands. With patience I came to know the variety of services available, and when and where on the dial to seek them: the regular news and entertainment programmes; weather forecasts for ships and aircraft; a radio amateur chatting to another on the other side of the world; an aircraft over the Atlantic reporting its position; beacon signals from

IN MEMORIAM
Edward Startz
20 February 1899 - 18 March 1976 †
Edward (Eddie) Startz, the world's pioneer shortwave broadcaster and for more than 40 years compere of the world's most popular shortwave programme - the Happy Station - has gone from us.
Before Startz, BC-DX was unknown. It started with him. On the occasion of the 40-th anniversary of the Happy Station in 1968, the Swedish Federation DX-Alliansen awarded him its Gold Plaque in recognition of his service to the DX hobby.
But his services to shortwave broadcasting in general were equally important, for his vast audience was made up of every SWL category. Among the stars on the shortwave firmament, he was the greatest.
RADIO NEDERLAND
Q
S
L
WERELDOMROEP

Shortwave personalities have been many, but the late Edward Startz who broadcast his programme "The Happy Station", from Holland for 40 years is undoubtedly the best known pioneer.


VK2ME
"THE VOICE OF AUSTRALIA"
Power - - - 20 Kilowatts
Wave-Length, 31.28 Metres
A.W.A. Owns and Operates
DARWIN
BRISBANE
VK2ME
SYDNEY
PERTH
ADELAIDE
CANBERRA
MELBOURNE
HOBART
The laughing notes of the Kookaburra open and close the A.W.A. World-wide Broadcasting Service.
Beam Wireless Services to Great Britain, The Continent of Europe and North and South America.
Beam Wireless Picturegram Service for the transmission of Pictures between Australia and Great Britain and North America.
Wireless Telephone Services to Great Britain, The Continent of Europe, North and South America, Java and New Zealand.
Coastal Radio Stations in Australia, Papua, New Guinea and Fiji.
Wireless Services on ships of the Australian Mercantile Marine.
Radio-Electric Works for the manufacture of every type of transmitting equipment and Radiola broadcast receivers.
Research and experimental laboratories.
WORLD-WIDE BROADCASTING SERVICE.
AUSTRALIA'S NATIONAL WIRELESS ORGANISATION
AMALGAMATED WIRELESS (A/SIA) LTD.
AWA

Australia's pioneer shortwave station VK2ME which was established in Sydney in the late 1920's.

satellites as they pass overhead; maybe a ship in distress, or an Australian on an isolated island off his mainland talking on a commercial radio-link to his girfriend at her telephone in Melbourne. When I had exhausted the capabilities of that early 5-valve radio, I bought a more powerful and sophisticated set. Of course, there is a vast difference between receivers of 40 years ago and those of today. In those early days I had to familiarize myself with the set's dial and with patience I came to know where particular stations were to be found. I used those stations as "light-houses" to enable me to find other adjacent stations on the dial. Today, with a modern specialized receiver, it is possible to find the frequency of a particular station from a chart, set an easily-read dial on the receiver to that frequency and expect to hear that station. Radio receiving can be relatively simple nowadays with the specialized receivers which are available.

The Shortwave Signal: Signals from shortwave stations differ from those of the broadcast or mediumwave stations. An example of the latter is your local station which the family listens to throughout the day and which cannot be heard clearly hundreds of miles away,

except perhaps at night. Shortwave signals can travel round the world in giant hops, being reflected by a layer of ionised (or electrified) air high up in the ionosphere and they can travel by day and night without losing much power. During the winter, you will probably find shortwave reception to be better during your daylight hours, while during the summer months you will probably find the shortwave bands to be more active at your night-time. You will find, hovever, that the shortwave bands are not active at all times. This is because there are many other conditions, including atmospheric disturbances and the presence or otherwise of sunspots on the sun, which affect radio signals. These varying conditions can make shortwave signals a little more difficult to receive and thus present you with a challenge to your receiving skills. Patience and perseverance will give you the experience which will enable you to obtain the best satisfaction from radio listening.

Inexpensive Equipment: It is not necessary to start shortwave listening with an expensive receiver. You can hear many powerful signals on a small transistor receiver; a two-band portable that covers shortwave is an ideal starting point for the newcomer to the hobby. On this receiver, if it covers the range from 530 to 30,000 kiloHertz, it covers all the frequencies that you require. On it you can find broadcasting stations, radio amateurs, ships, aircraft, CB stations and many other services within this range of frequencies. It is likely that a two-band set will give much less a range of such frequencies, but even so it can provide a good beginning.

CHAPTER TWO

The shortwave receiver

The choice of receiver is the first consideration for a new listener who wishes to listen to shortwave. In every case, the more expensive the set, the more sophisticated and wide ranging its performance; so cost is mainly the basic factor. In this chapter we cover some of the various aspects of a good shortwave receiver,and review some of the interesting sets on the market.

From mail received from listeners it is often obvious that a new listener has great trouble in reading the dial and even in knowing whether his receiver covers the shortwave bands or not. A "band" is a group of frequencies, and it is often also stated in the metres of the wavelength of the average frequency of the group. If your set has only a single band and is marked BC or AM or MW, these all stand for the mediumwave band on which you receive your Radio New Zealand stations and other commercial broadcast stations. The dial calibration will probably be 5, 6, 7, and up to 16. Owing to the small space available on the scale of the dial, these numbers actually indicate hundreds of kiloHertz, and the 16 stands for 1600Hz. It will also be found on the smaller transistor portables that there is little margin when you are tuning between stations. At present there are 120 frequency channels on which mediumwave stations in Australasia are operating and so, if you live in some areas close to several stations, some can be found near each other on the dial and even occasionally may interfere with one another.

But it is a shortwave receiver we are interested in, and therefore as well as a mediumwave band the receiver should desirably have at least one shortwave band covering 6-22 megaHertz (which in kiloHertz are 6000-22000kHz). Such a receiver would give you coverage of the main international bands but it would be better to look for a multi-band receiver with SW1, SW2, etc., giving you band indications; or better still, a communications receiver which covers 530-30,000kHz continuously and is divided into 30 bands of easy

This collection of receivers used for shortwave listening was photographed at the DX League Convention recently and included FRG-7, Drake, Barlow-Wadley and many other models.

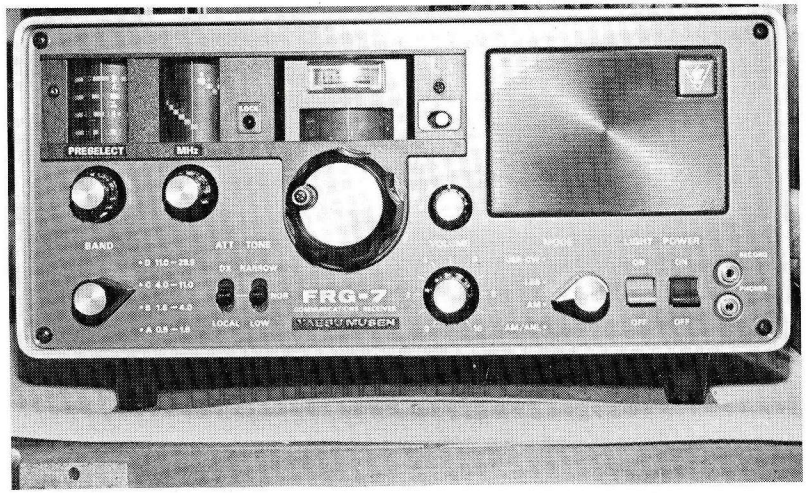
tuning, and on which you will be able to receive all the stations described in this book. If you purchase any multi-band receiver you should try to get one that has continuous coverage from band to band; say, for instance, 1.6-4, 4-10 and 10-26MHz. On such a receiver you would cover all the frequency range from 1.6 to 26MHz without any gap. Some receivers give only the more common international bands and there is a gap between the frequency ranges. In the near future it is expected that a conference in Geneva will allocate extended frequencies for international broadcasting and this will mean that the type of receiver with band gaps may not cover the new bands allocated. For instance, the 31-metre band is 9.500-9.775MHz and this could well be extended to 10MHz which would mean that this new part of the band could not be received on your radio if it is designed for the present 31 metre band only. A continuous coverage receiver accommodates any band extensions, and you would have all possible frequencies for a band covered in the one receiver.

Points to Look For: One of the first is the ease of reading the dial; it should be well calibrated in frequencies or, better still, have a

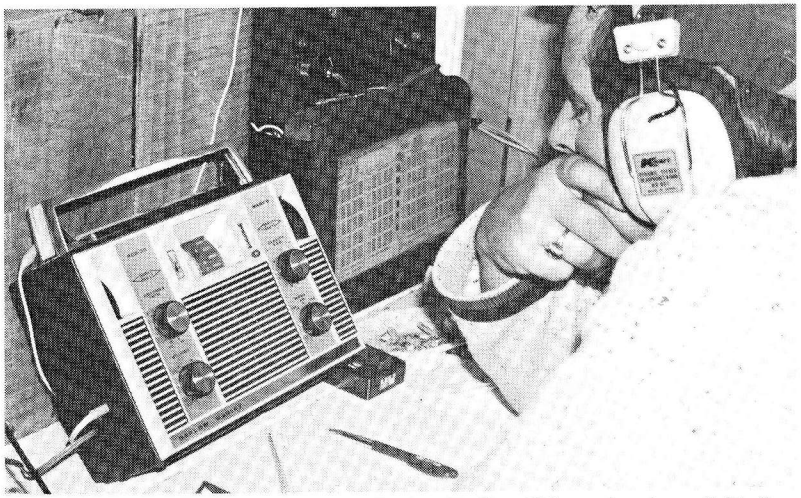
read-out visual display which shows on a panel in changing figures the frequencies you are tuning to, much like the display on a pocket calculator. This latter shows you on the panel the exact frequency you are tuned to. A dial that is cluttered with other markings and call signs soon becomes out of date, and can be difficult to understand if the listener is new to the hobby.

Other important points to look for when purchasing a shortwave receiver are in its performance capabilities, because basically these are the things which are going to enable you to have clearer reception and better signal-to-noise ratio; in other words, the stronger the signal and the less the unwanted noise makes your listening more satisfying. The factors you should look for are selectivity, image rejection, band-spreading and stability.

The selectivity of the receiver is judged by the width the station received takes up in the band. A set with poor selectivity lets a station be heard over much of the dial as you tune, and sometimes two or more stations can be heard interfering with one another. On the other hand, a set with good selectivity sets a limit to the frequencies over which a station can be heard. Most communication receivers have this indicated in their instruction manuals, and it could be 5kHz, 2.5kHz or 1kHz or a similar system of reducing the width of the



The FRG-7 which is widely used by shortwave listeners. Available from Radio Engineering Limited, CPO Box 764, Dunedin, and Dick Smith Electronics throughout Australia.



Ray Crawford tunes in the world on his Barlow-Wadley. This receiver is available from John Gilbert & Company, Tasman Buildings, 16 Anzac Avenue, Auckland.

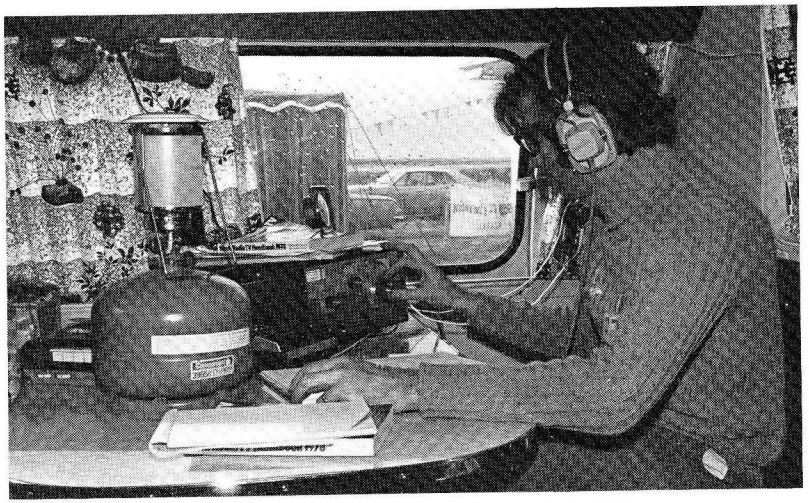
incoming signal. What we are looking for is a receiver which will reduce the interference from stations on either side so that you can have fairly clear reception of the station you want. International shortwave stations are allocated frequencies 5kHz apart, and so when there are two strong signals side by side the receiver must be capable of rejecting the interference from the unwanted station.

Images: Some receivers will suffer from images from strong signals on frequencies other than those to which the receivers are tuned. These unwanted images appear and some image rejection in the receiver is necessary to combat these. This is often the case on mediumwave when using a transistor receiver with a long aerial, and you will hear Radio Australia and other powerful shortwave stations breaking through on to the mediumwave band. Image reception could also include Morse, radio-telephone and other signals which appear in an international band which you are listening to, but actually are being transmitted on other frequencies. A good receiver with image rejection could combat this unwanted interference.

Band-Spreading: This is an extra aid to your tuning in a wanted station, but on an additional scale on the receiver. It is a fine-tuning

control. The average shortwave receiver of the portable type may give only one to two inches on the tuning dial for any particular section of a band, yet there could be up to 100 stations using this part of the band. This means that you have to tune very slowly, and very carefully move the tuning knob in order to bring in one signal from another. If the set has an extra band-spread control knob then this other scale control takes over and you can spread the stations out equivalently to a greater length of the main dial. New listeners get frustrated with the many stations on a typically small section of the average shortwave dial, but band-spreading can help to make stations easier to find, and the main tuning control knob becomes not so critical. In the communication receivers, band-spreading is not necessary as the dials are calibrated so that they present no problem in this aspect of reception. In the case of a receiver with band-spread on the main tuning dial, it normally has an indication of where to switch to band-spread, and then you move from the main tuning dial to the band-spread dial to cover any particular section of the band which will be marked in greater detail on the band-spread dial.

The last point to look for is the stability of the receiver, and this is the capability of the receiver to stay tuned to a signal despite being subjected to a number of outside influences. These would be an alteration of the gain control setting, or a variation in the



Bryan Clark listens in a caravan on a Drake SPR-4

The Sony ICF6800W the most outstanding digital display receiver on the New Zealand market. Agent: Tricity House, P.O. Box 1410, Chrischurch.

temperature of the surroundings, or fluctuations in the power supply voltage, or mechanical shock. This last item is usual in the case of portables which are moved around a lot. Any of these factors can make a receiver wander off the frequency it is tuned to. Listeners may notice when they tune their receiver to a station that, after a while, it drifts slightly off the station it was tuned into and an adjustment will be necessary, and this could be caused by any one of the above factors. A good communications receiver has extra features built into the circuit of the set to compensate for any tendency to drift.

Receivers: The range of receivers available for shortwave listening is extensive, and new models and new ideas are constantly being marketed for the buying public. This short review covers some receivers which are popular with shortwave listeners.

Barlow-Wadley: This South African produced portable was one of the earlier ones to revolutionize radio listening with its readout dial. The receiver has poor mediumwave reception capabilities, but

with some modifications of the circuit improved results have been obtained. On shortwave the set rates among the best.

Drake SPR4: This receiver is one of the popular makes with shortwave and mediumwave listeners. The receiver is solid state and has accessory crystals to cover all bands. With 23 ranges, each band tuning 500kHz, the listener can select the bands he wishes to receive. This receiver can cover 500-30,000kHz. The SPR4 covers the most wanted frequencies, but others can be added or changed to suit special listening requirements.

FRG-7: This communications receiver is the most popular in New Zealand, being used by many amateurs, shortwave listeners and radio enthusiasts in general. It has continuous coverage from 530 to 30,000kHz and uses the system of a megaHertz setting for the band, then kiloHertz reading to put you on the exact frequency. Operation is relatively simple, the pre-select must be used always to ensure maximum performance when tuned to a frequency, and with its use of mains or battery it is a versatile receiver.

Sony ICF-6800W: This is undoubtedly the receiver of tomorrow: its introduction into New Zealand will revolutionize listening, as its accurate readout display gives the exact frequency down to one kiloHertz when tuning. Having been given the chance to evaluate the first receiver imported into this country, I am impressed with its capabilities: its performance was as good on mediumwave as on shortwave; its coverage was complete up to 30,000kHz and its operation easy. Choosing the megaHertz band first and then the display shows the exact frequency you are tuned to. Selectivity is excellent with available broad and narrow bandwidth. With the many other added features included in this receiver, I give it the highest recommendation for a receiver available in New Zealand today.

DX-300: Not yet available in New Zealand, but is being chosen by many new receiver buyers in Australia and the United States. Early reports indicate this receiver with visual display of frequencies is proving popular, and in the class of receiver under $400 is certain to capture the market. Specifications show it to be first-class in all modes of operation, and, following the success of two earlier receivers, the DX160 and the SX190, this model available in Australia from Tandy Stores combines low price, modern construction and the latest in receiver dial display in one communications unit.

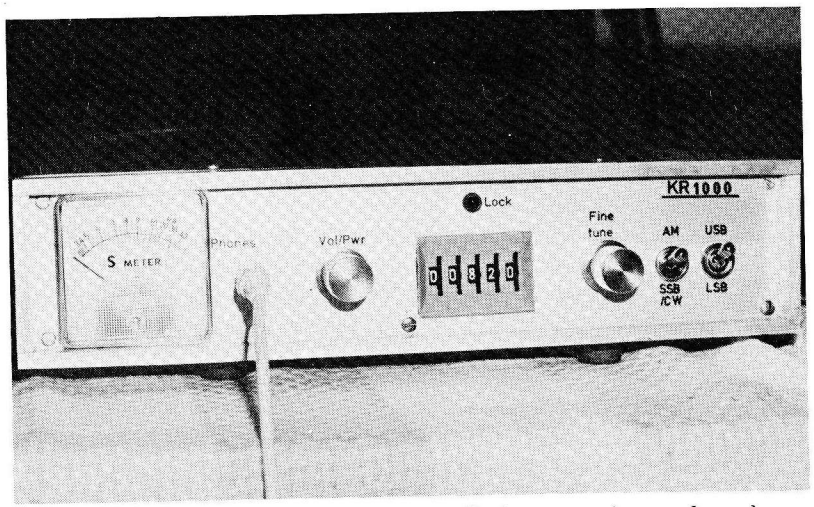
Receiver Terms and Abbreviations:

AC: Alternating current. The current in the power mains keeps on changing, (or alternating), its direction to and fro in the wires several times a second. Do not connect a battery into a socket marked AC on your receiving set: the only place the set will then go is to the repair shop.

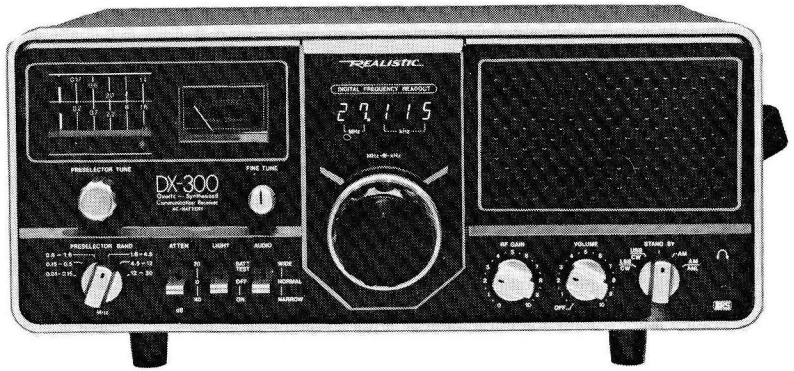
AF: Audio frequencies. Sound frequencies which can be heard by young ears, (30-15,000+Hertz). AF marked beside a knob on your set indicates that it controls the volume or gain of your speaker; soft-loud.

AF GAIN: Controls the output volume of your loudspeaker or headphones.

Frequency Audio Filter: One version now on the market is plugged between the output of the receiving set and the loudspeaker (or headphones). If there is not a socket for the loudspeaker (or headphones) in your set, then the loudspeaker would need to be disconnected and the filter inserted. Headphones are plugged into the filter. Controls with the filter allow you to separate two incoming signals which are very close together in frequency: either to increase the reception of one or to suppress the other. If it is also an "agile"



Read-out receivers which give a visual frequency display are proving popular and many models are available.



DX300 the latest digital receiver is now available to Australian listeners from Tandy Corporation, P.O. Box 229, Rydalmere 2116, New South Wales, Australia.

filter, it can be adjusted so that any incoming signal with a steady note (whine or whistle) is automatically suppressed.

AGC: Automatic gain control. If the incoming signal starts to fade, then the agc gives it a boost. It tends to keep the volume at an even level.

AM: Amplitude modulation. A system of transmitting voice and music on radio signals. Most mediumwave stations use this system.

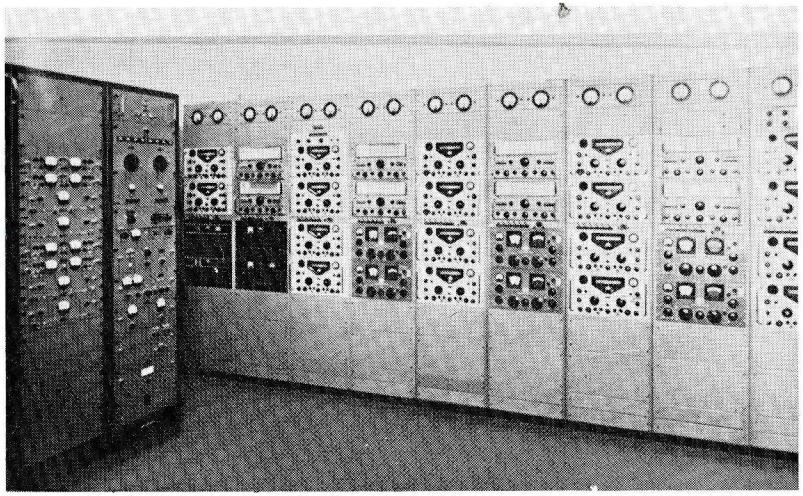
BFO: Beat frequency oscillator. Most Morse signals, (also called CW signals), cannot be heard on the average receiver because these signals do not carry a tone on them. The BFO is a control which supplies a tone, thus allowing Morse to be heard. A BFO can also allow SSB signals, which on the average receiver sound like "duck-talk", to be understood. Can also resolve DSB signals.

Cal.: Calibrator. A device in your receiver for you to line up the dial correctly.

crystal filter: A device which is built into the circuit of communications receivers to give you extra selectivity control. It separates two incoming signals which are close together in frequency.

CW: Continuous wave. Most Morse signals are CW. (See also BFO, above). A control marked CW lets you put a tone on incoming signals.

DC: Direct current. Opposite of AC. The type of current you get from a battery. It flows only one way in a circuit. Be careful to connect the + (positive) of the battery to the + of the socket in your transistor



This rack of receivers at the BBC Monitoring Service at Caversham Park in England, includes several Racal RA-17 models.

receiver. (Your budget counsellor recommends this practice).
detection (and detector or demodulator): The changing of radio signals in the receiver into sound in your loudspeaker or headphones.
DSB: Double Sideband. A system of transmitting voice and music with the radio signals. Sounds like "double duck-talk" in the average type of receiver. May be made intelligible with a BFO (or CW) control, but needs very careful adjustment.
feedback: Part of the output of a stage in the receiver is fed back into an earlier stage. Depending on the way this is done, it can lessen distortion in an amplifier, or it can increase the overall output of a wanted signal. It can also cause instability.
Gain control: Volume control.
heterodyne: A high pitched tone (whine) which results from two signals interfering with each other.
HT: High tension. High voltage. (Opposite of LT).
LSB: Lower sideband. (See SSB, below). SSB may be upper or lower sideband.
Noise limiter: NL or ANL. Noise clipper. Static quietener.
Preselector: Incoming signal amplifier. Makes the receiver more sensitive.
RF: Radio frequencies.

RF gain: Controls the amount of signal input to your receiver; signal level control.
S-meter: A meter in a receiving set which tells you how strongly or weakly your set is receiving the signals. It may be marked 0 to 9, (9 is strongest).
Selectivity: The ability of a receiver to separate stations which are close together on the dial.
Shortwave: In this book it refers to radio signals which have radio frequencies above 1600 kiloHertz. A dipole aerial for shortwave reception is much shorter than a dipole required for mediumwave, (or broadcast band), reception. (See Chapter 4).
SSB: Single sideband. A system of transmitting voice and music with the radio signals. Sounds like "duck-talk" on the average type of receiver. Can be made intelligible with a BFO (or CW) control. Most radio amateurs speak on SSB nowadays.
Superheterodyne: The incoming radio signals are changed to a fixed frequency within the receiver before they are amplified. This process lets you have fewer tuning controls on your receiver.
TP: Technical Purist who argues that the explanations of terms in this list are too brief.
USB: Upper sideband. Opposite of LSB.
xtal: Crystal.

(Compiled by Tom Duerden, ZL4IJ)

CHAPTER THREE

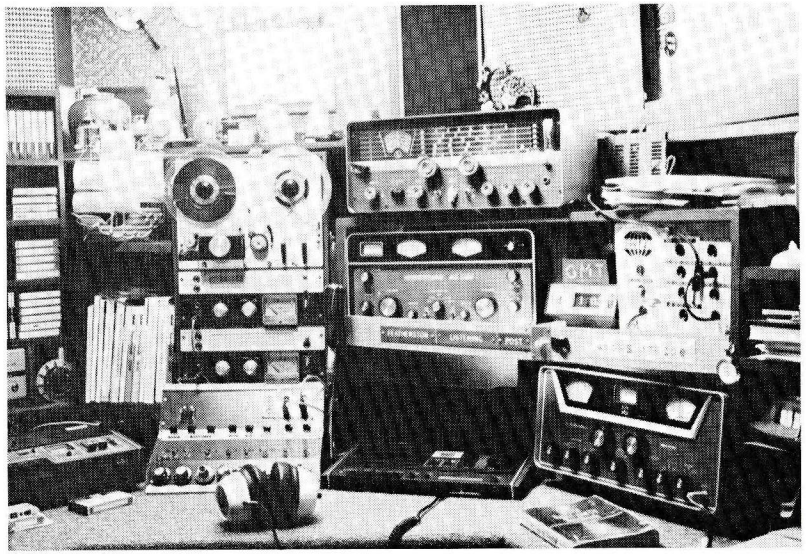
How to set up and operate

When setting up your listening post, provide for ease of access to your equipment. If you have purchased a communications receiver, it is advisable to locate your table or cabinet against a wall and near a window. The outside wall is preferable because it reduces the length of wire required to connect your set to your aerial and earth system.

Make certain that you have sufficient power leads at the receiving point so that you can operate not only your receiver but also a tape recorder. As you expand your listening you will find the need for other equipment also.

The earth is an essential part of your receiver, and though many discount its usefulness, it should be fitted to your radio. All that is necessary is a wire connecting the earth terminal on the metal frame of the receiver to a pipe driven into the ground outside the window in a damp area. If the area is not damp it may be a good idea to dig a hole and place a larger pipe in this, filling it with gravel and then drive your earth pipe through the centre. You can then fill the hole from time to time with water, giving your receiver the benefit of dampening down any radio noise. At the same time you should have a lightning arrester between the receiver and your aerial. This is generally fitted under the eaves of your house with one side of the arrester carrying the aerial to the receiver and the other side down to your earth pipe. Transistor receivers, even of the communication type, can be subjected to severe damage if struck by lightning, or even an increase in power voltage, so it is wise to protect your equipment from these hazards.

Your receiver should be at eye level so that you can tune the dial and get an accurate reading from a sitting position.Your chair should not be too comfortable, because if you are doing much listening you should be awake and alert. An accurate clock is essential, and these days a digital read-out clock is of great assistance, particularly if it is a 24-hour one. It is desirable to have the clock permanently on



The listening post of Chris Davis of Featherston, New Zealand includes three receivers and recorders.

Greenwich Mean Time. A clock with a second hand is also an advantage because, when you are listening to distant radio stations, particularly on mediumwave, there are only 10 seconds allotted for station identification, and therefore you must be accurate in your time, otherwise you can miss the station announcement.

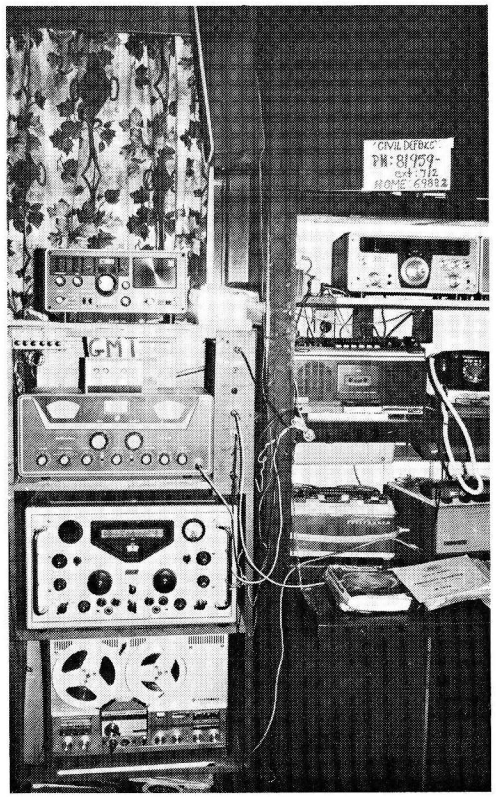
A typewriter is also a boon, for not only are your typed reports neatly presented to the stations but also carbon copies of the reception can be retained for future use. (Reception reports are discussed in Chapters 9 and 10).

Some system of aerial-switching aids to simplicity of operation, because you will find when you later come to use two or more aerials that it will be necessary to disconnect one and connect the other to your receiver, and this can be a time-wasting job, particularly if the change of aerials does not improve the signal being received. A suitable switch can be purchased from your radio dealer.

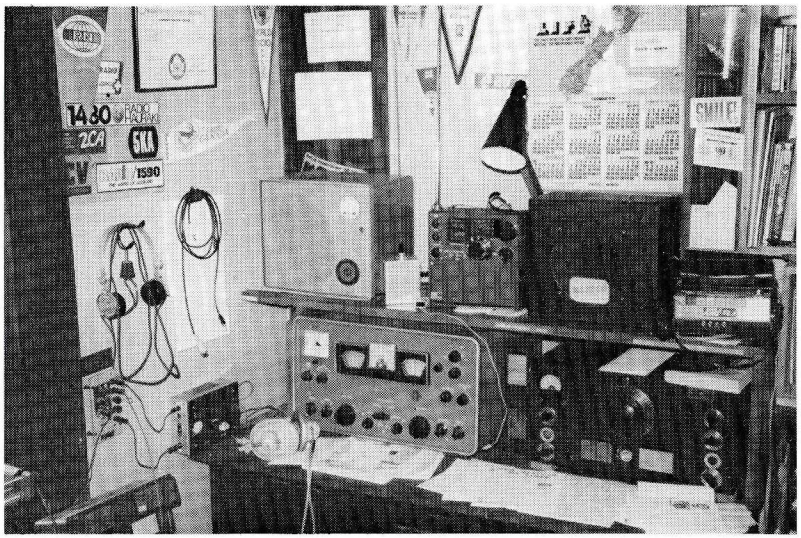
The Correct Time: It will not be very long before you will notice some unusual sounds coming from some stations. These stations broadcast a specialized programme of tones, and time pulses or pips.

They use frequencies such as 2,500; 5,000; 10,000 or 15,000 kiloHertz. You will find that these are very useful stations because they broadcast extremely accurate standards of both time and frequency. There are quite a few of these stations in different countries around the world and they provide a most important service to science and technology. They are also useful to the average DXer in that they provide a convenient source of the precise time and a means of checking the calibration of his receiver. Some of the better known stations include WWV and WWVH in the United States and Hawaii respectively, JJY in Japan, CHU in Canada and VNG in Australia.

VNG in Melbourne operates on 4500, 7500 and 12000kHz, and gives time announcements each quarter hour with a longer time pip



The writer's listening post includes in the left cabinet-FRG-7, Hallicrafters SX122, Racal RA-17, Telefunken recorder, and on the right Allied SX190, Aiwa multiple band cassette radio, and two other recorders. The six push button controls under the FRG-7 feed the aerials to the receivers while the plug board in the centre of the photo carried the programmes from the receivers for recording purposes.



Arthur Williams of Invercargill, as well as having an excellent collection of vintage radios also uses a Sony, and lower left Hammerlund and HRO.

each minute. VNG broadcasts from Lyndhurst in Victoria and is operated by Telecom, Australia.

The most popular station with shortwave DXers is WWV located in Boulder, Colorado, or WWVH broadcasting from Hawaii, both on 2500, 5000, 10,000, 15,000 and 20,000kHz. The stations have a voice announcement each minute; a woman announcer from WWVH is heard shortly before the minute, and a male announcer from WWV introduces the actual minute tone. As well as the time information, weather details are included between the minute announcements by both stations. It will be found that this is the quickest means of getting accurate time, and, of course, the frequency is so accurate that your receiver can be calibrated by the signal; in other words, the dial reading of 10mHz should be exactly on the spot on which you tune in WWV. If it is not, the dial of your set is not accurate and should be recalibrated.

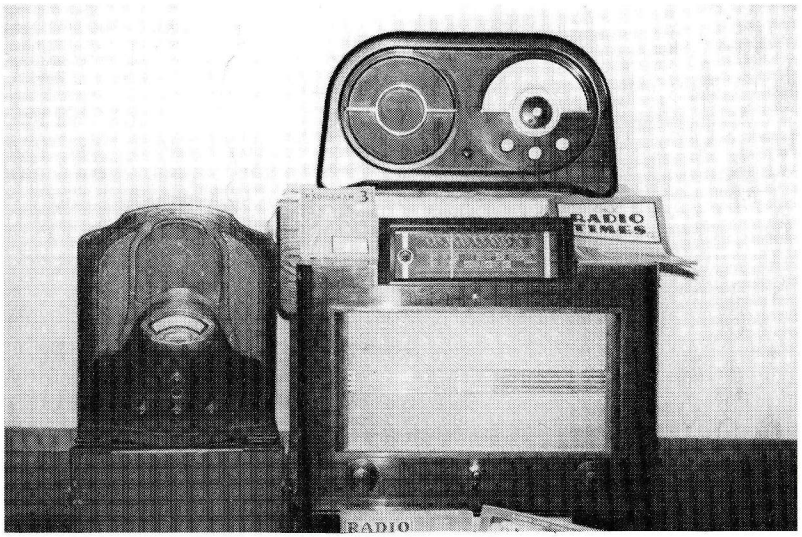
Practise Safety: The new listener should remember that when working with electricity every care should be taken, because if you become complacent and neglect safety precautions, electricity can

kill. Always turn off the power at the wall socket before you work with your receiver; make certain that it is "dead" before doing any adjustments to internal parts of the set.

Make certain that the earth you install is to a pipe outside as described earlier; never attach your radio to the earth wiring which is used inside your home and which is attached to the electrical system, as this could have not only dangerous consequences but could also be a source of unwanted noise. If interference from mains is coming through the electric lines into your home, it is possible to reduce this by a mains filter which can be purchased from your radio dealer.

If you decide to use headphones, then you have a choice of several types, but the stethoscopic style which hangs on your ear lobes gives you more freedom of movement, though, of course, you could also be disturbed by other room noise. There are many modern types of headphones which completely cover the ears and, being lightweight, are comfortable to wear when you are listening for long periods.

Always have respect for others in the household and, if you are listening late at night, listen on earphones.



These receivers were the most popular with listeners in the 1930's, top - Ekco SW86, 7 tube 1936: lower - Philips 362A, 9 tube, 5 band 1937: left - Patterson Allwave, 8 tube 1933.

Local Interference: If you have a fluorescent light in the home this could cause some interference to your reception. Your home television set will make DX listening on mediumwave and shortwave difficult because it transmits low-powered signals which can be heard as buzzing whines at regular spots over all the radio bands on nearby receivers. Therefore you should be listening as far away as possible from these sources of noise because there is little that you can do to combat them. If you hear Citizens Band or Amateur or Police operators coming in on your set away from their normal bands, it is likely that your set is not selective enough. They should not be heard out of their bands on a good communications receiver with a good aerial system.

Recording Signals: Most shortwave listeners use tape recorders from which they prepare their reception reports and this can be a very vital adjunct to your DX listening post. To be able to record a station announcement, and play it back time and time again so that you get it word-perfect, makes for a very presentable report to the radio station.The cassette recorder can be one which is built into the radio, but better still a separate recorder is advisable. This operates from mains or battery and can be fed from the back of your receiver on your extension speaker output, which means that you are not recording on microphone, and any talking or other activity in the room does not appear on tape. Another advantage of recording stations on tape is that you can announce the time of each announcement on to the tape and have a running picture in time sequence of what has been received before you decide to make a report on your reception. The tape recorder is also of help to you when you hear signals which you cannot identify - it could be a language you do not understand - and a workmate could well translate this for you. You can also record your favourite programmes, DX sessions, talks and other spoken information, and set yourself up with a tape library which over the years will be of great historic value and will enable you to look back on reception as it was when you started listening.

In earlier days, tape recorders were frowned on by some DX listeners as a means of logging stations without much effort. But more and more broadcasters realise that spoken programmes of interest to shortwave listeners are generally recorded and so the speed of their speech does not have to be slowed down by them because few listeners are nowadays writing this down in longhand. If possible your recorder should be fitted with an automatic stop, as it is

most frustrating to find that a station you have heard has not been recorded because the cassette has run past the end of the tape.

(The filling in of reception reports is dealt with in Chapters 9 and 10).

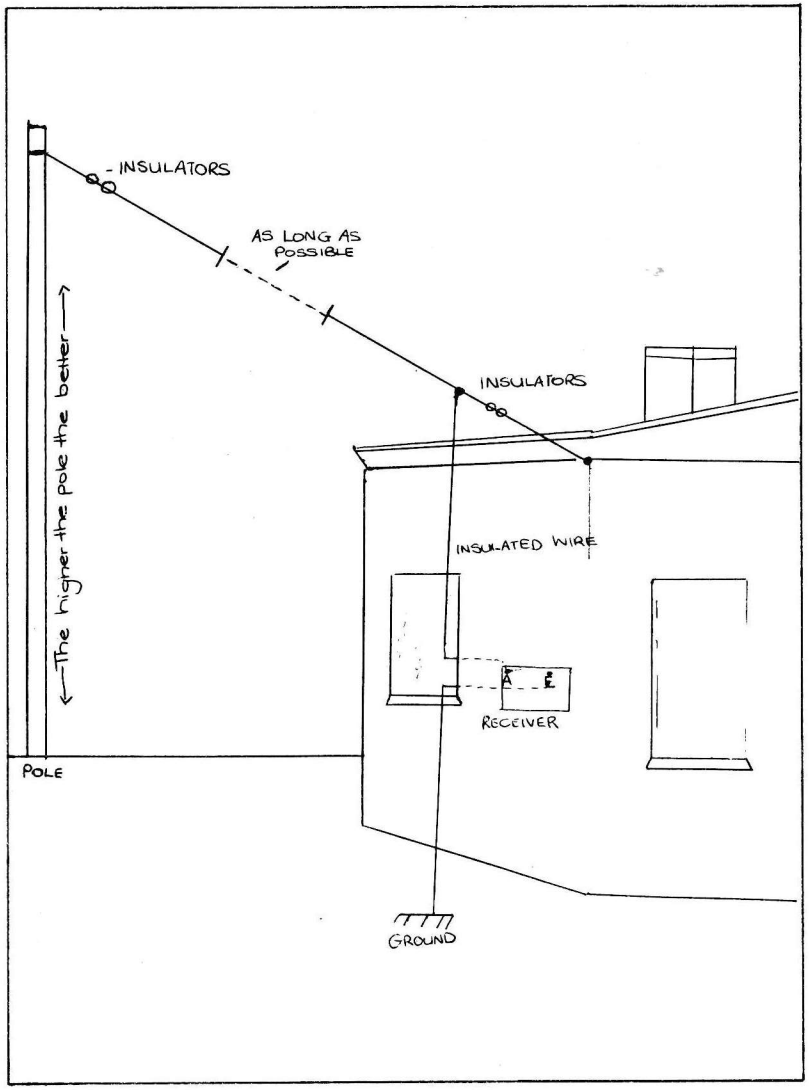
CHAPTER FOUR

Antennas for shortwave

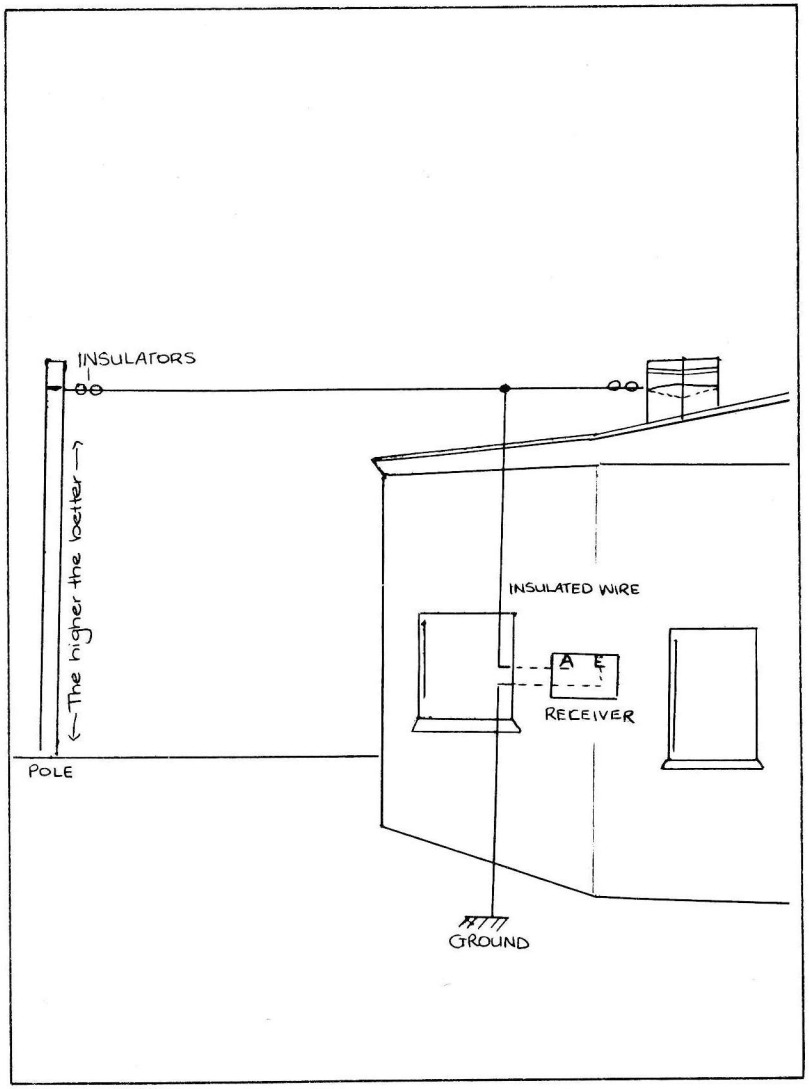
The aerial is an essential part of your receiver, and even though a portable with a telescopic aerial would be adequate for some listeners, an outdoor aerial is essential if you want to get the best value from your receiver. In this chapter we deal with some simple shortwave aerials. An aerial for the beginner need not be a complex affair; a simple, outdoor, horizontal or sloping wire will usually effect a tremendous improvement over an indoor aerial. Always scrape the insulation, including enamel if any, from the end of the wire where it connects to the aerial terminal of your set and at points where you join wires.

Aerials for mediumwave reception are covered in Chapter 9, but I should mention here the Beverage which can give good performance on all bands. This is a long-wire aerial which consists of a wire several wavelengths long, pointing towards the country from which you want the best reception. The wire should be supported above the ground on insulators at a height of 2 - 3 metres and should be at least 80 metres long. The far end should be connected to earth by a resistor, and the near end to the aerial terminal of the receiver, and it is preferred that the lead-in be a covered wire. Your radio dealer can sell you a suitable resistor, say 500 ohms. It is obvious that this type of aerial is one which requires plenty of space, and the mediumwave listeners using this type are generally operating in a rural location, away from the noise which is the constant concern of the city listener. Some Beverage aerials are kilometres in length, and have an aerial tuning device at the receiving set's end.

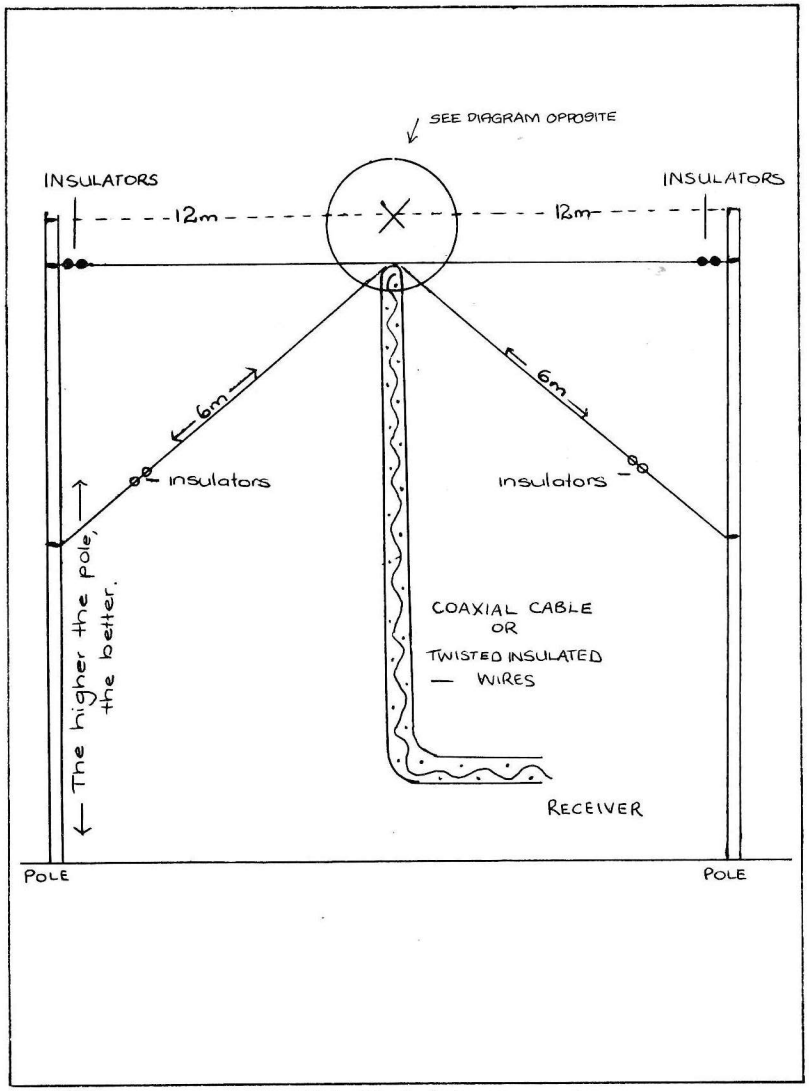
The shortwave listener may have his activities confined to a flat, in which case indoor aerials may be the only means of increasing signal level. In such a location, a wire placed around the room could add to the performance of the receiver, while a vertical rod aerial attached to the building would also assist in increasing the performance of your radio.



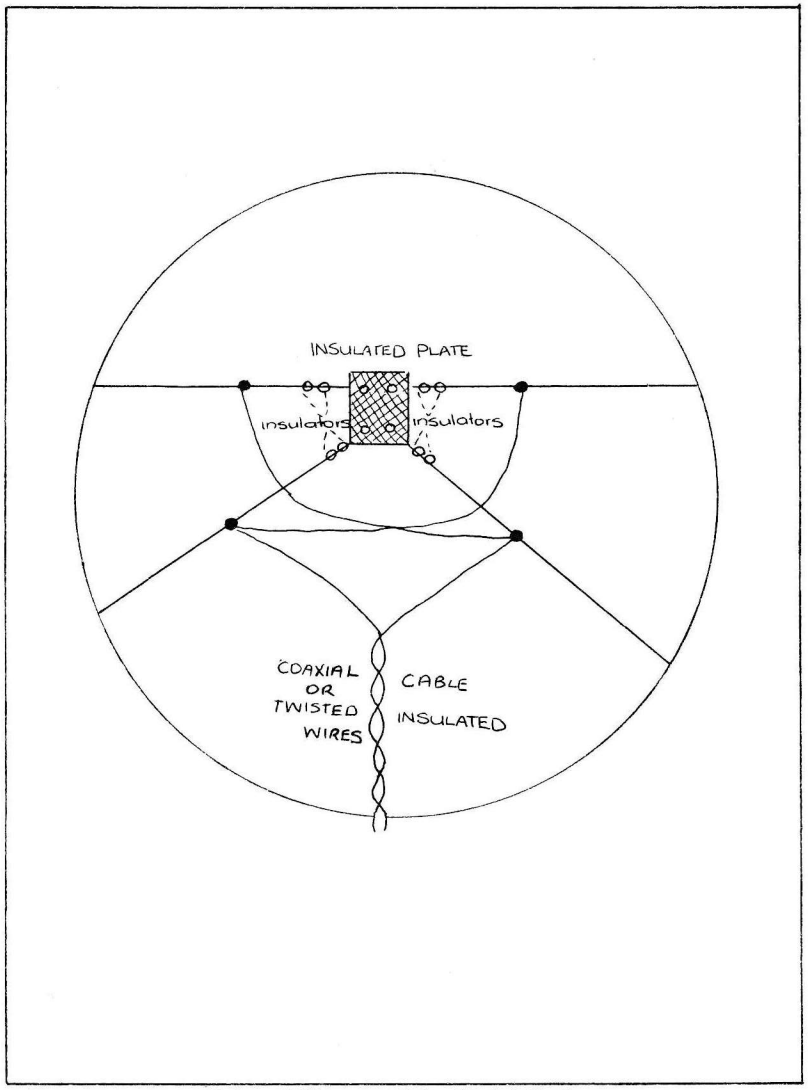
Long Wire Antenna



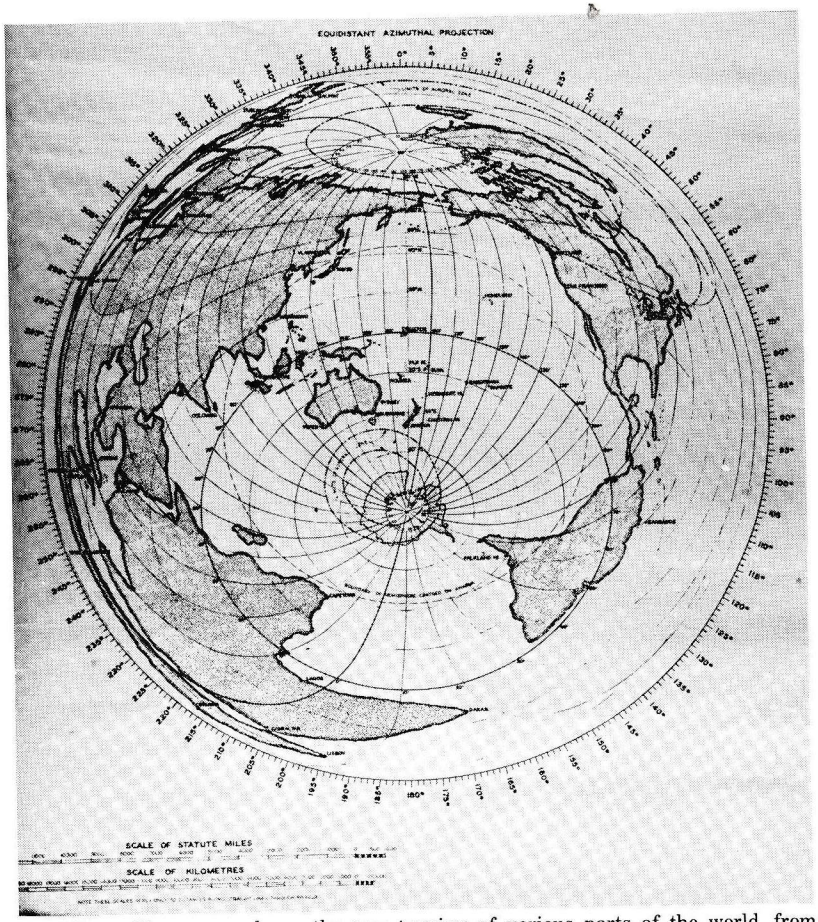
Inverted L Antenna



Twin Dipole Antenna



Enlarged Diagram of the Circled Section



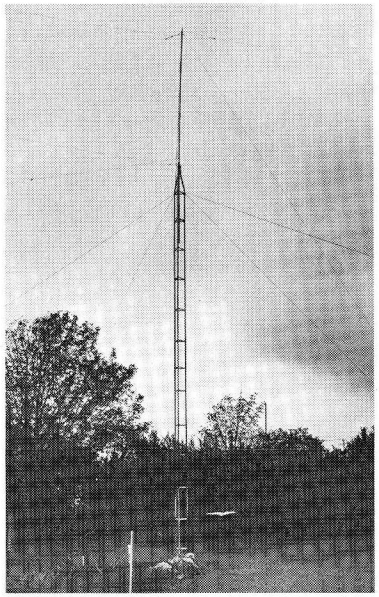
This Great Circle map shows the true bearing of various parts of the world, from Southern New Zealand. This map will enable medium-wave listeners to lay out long wire aerials in the direction of the country they plan to receive.

Outdoor Aerials: The importance of a really good aerial cannot be over-estimated. (The importance of a good earth connection has been discussed in Chapter 3). Even the best receiver cannot yield good results without a good aerial. It can even be said that the better the receiver, the better the aerial should be. Every aerial has a quality that it is adapted to a certain shortwave band on which it gives the

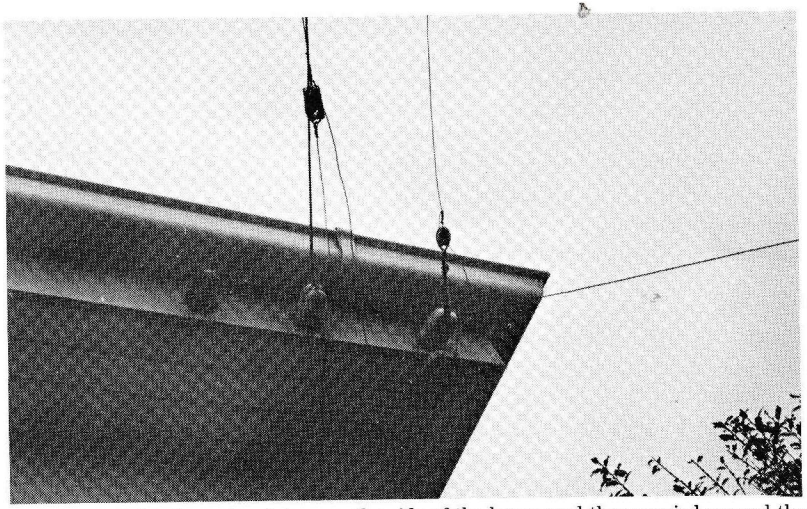
strongest signal to the receiver. The further you move away from that band the less the aerial responds.

The horizontal aerial also has a directional quality: as a rule, signals from a certain direction or several directions relative to the aerial will always give the best reception results. You must be aware of these factors before you put up your aerial, and you should experiment over a period of time before deciding on a fixed position for your aerial.

Before some effective shortwave aerials are mentioned, it will be useful to discuss some of the principal rules to be observed in putting up the aerial. First and foremost it must be placed as far away from electrical installation wires as possible and, if practicable, at right angles to them, but not over or under them. The height above the ground should be 10 metres or more — the higher and more exposed away from trees and buildings the better. The aerial itself should be of copper wire slung between aerial insulators. Aerial wire need not be insulated but must not, of course, touch objects which are not insulated, such as metal.



This 18 metre lattice tower carried five aerials into the author's home.



Aerials are fed to large insulators on the side of the house and then carried around the corner to lightning arresters and into the receivers.

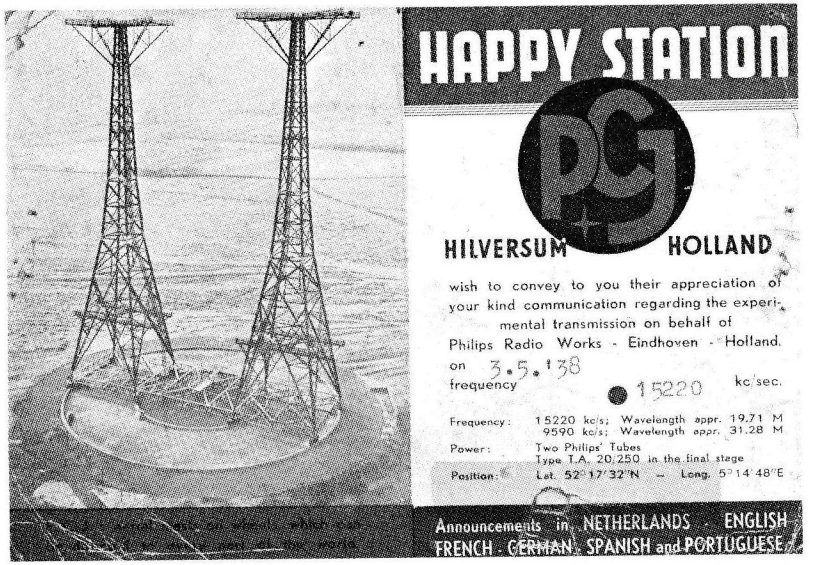
Inverted L: Imagine an aerial looking like an upside-down letter L. This simple aerial consists of a single wire which is elevated as high as possible and clear of surrounding objects. It has a horizontal part and a down-lead at the receiving set end. The length for normal "all band" reception is not critical but should not be less than 10 metres. With some receivers it may be advisable to avoid lengths greatly in excess of this, so experiment with various lengths if possible. It is interesting to experiment also with a variable capacitor of about 350 pf connected between the aerial and the receiving set. Rotate the variable capacitor slowly until you get the best improvement to the signals being received. Ask your radio dealer for a suitable variable capacitor. The lead-in should be kept clear of metal objects and come direct to the receiver. The shorter the lead-in the more efficient the aerial.

Always remember to make as few joints as possible in your aerial, (preferably none): solder joints and the lead-in to the aerial proper or at least cover the joint with insulation tape. If you live in an area near the sea, salt spray could reduce the efficiency of the aerial if it becomes coated, and cleaning with sandpaper would improve its performance. The guy wires from the pole you erect should be of heavy gauge. In some cities it is necessary to make application for permission to erect a mast above a certain height.

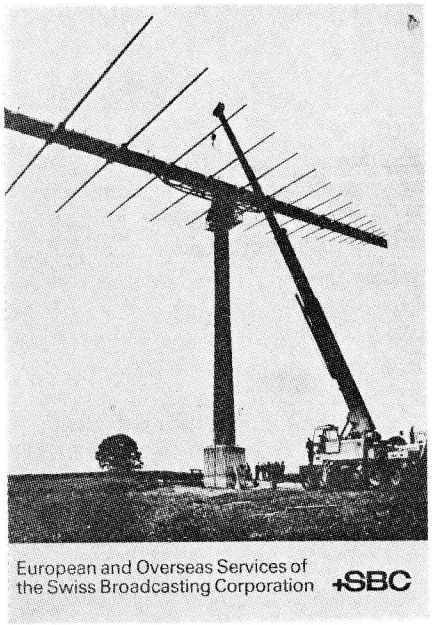
Horizontal Dipole: This is a horizontal aerial which is split in the middle with insulators, and a wire from each half coming from the middle to the aerial and earth terminals of your set. It is like two inverted L aerials, end to end, with the down-leads coming from the middle to your set.

Typical dimensions of a horizontal dipole for the various shortwave broadcasting bands are given below, but one dipole supported as high as possible above the ground may be expected to perform reasonably well on other bands in addition to that for which it is specifically designed.

The dipole is best sited broadside on to the desired distant transmitters, since it is most sensitive to signals coming from that direction. It is least sensitive to signals coming from the end-on direction, and by judicious use of these characteristics interference from other sources may be reduced. Some experimenting may be necessary to find the best compromise between high signal strength and minimum interference. Twist the down-lead wires around each other, or tape them together. Connect one to the aerial terminal of your set, and the other to the earth terminal of your set.

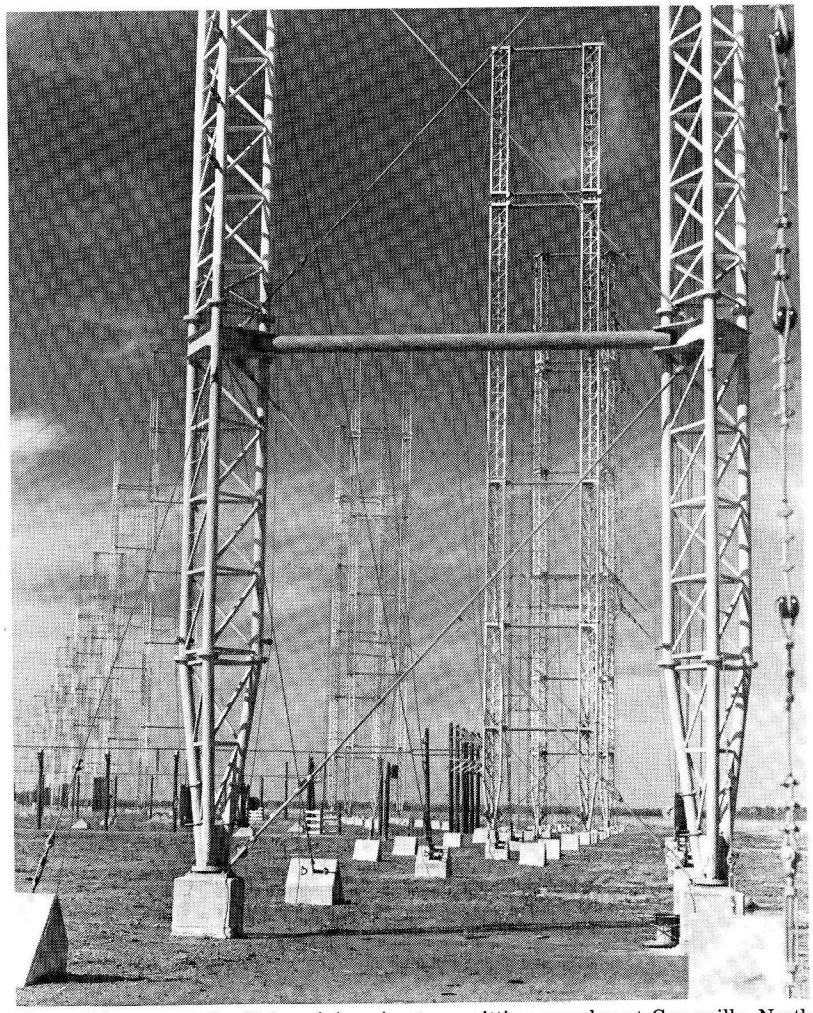

HAPPY STATION
PCJ
HILVERSUM
HOLLAND
wish to convey to you their appreciation of your kind communication regarding the experimental transmission on behalf of
Philips Radio Works - Eindhoven - Holland.
on 3.5.'38
frequency 15220 kc/sec.
Frequency: 15220 kc/s; Wavelength appr. 19.71 M
9590 kc/s; Wavelength appr. 31.28 M
Power: Two Philips' Tubes
Type T.A. 20/250 in the final stage
Position: Lat. 52°17'32"N — Long. 5°14'48"E
Announcements in NETHERLANDS - ENGLISH
FRENCH - GERMAN - SPANISH and PORTUGUESE

Early broadcasters had the idea of rotating their aerial in order to beam programmes to various parts of the world, and the first and most famous is that of PCJ in Holland.



The Log Periodic antenna is a modern version of what PCJ were trying to do, and this concrete structure 75 metres long atop a 50 metre concrete tower can be rotated 360 degees in two minutes.

Aerial Selection: One aerial, although efficient for a particular shortwave band, cannot replace a selection of aerials designed for different types of reception, and it will be found that most shortwave listeners use a selection of aerials. The writer has an 18-metre lattice tower which provides the support for five different aerial systems. There are three long wires covering a city block in three directions, north-east, south-west and north-west; plus a 25-metre dipole, and an "omnidirectional" (for monitoring the BBC and other broadcasters) which is only 15 metres long and 10 metres high. This short aerial is a typical aerial that would be found in the backyards of most radio listeners, and its performance would not provide signal reception better than the aerial of the casual listener to shortwave, as it is of little value to broadcasting organizations to receive reports based on sophisticated aerials which give a highly coloured picture of what reception is commonly like.



The aerial array at the Voice of America transmitting complex at Greenville, North Carolina, USA.

Typical Lengths for a Dipole: This table shows the frequency to which the dipole will give maximum response and the length of each half of the dipole is given.

Metreband	Frequency Range MHz	Length of wire for each half of dipole in metres (The down-leads are not included in these lengths)
11	26	2.75
13	21	3.25
16	17	4.00
19	15	4.75
25	11	6.25
31	9	7.75
41	7	10.25
49	6	12.25

CHAPTER FIVE

Time and time conversion

The world's time is based on Greenwich Mean Time which is the meridian of longitude running through Greenwich near London, England. The world is divided into 24 hourly sections around the equator and so half of the world is ahead of GMT in time and the other half behind GMT. It means that Asia, Australia, New Zealand and part of Europe and Africa are ahead, while the Americas and Eastern Pacific are behind GMT. In Australia there are three time zones: Eastern Australian Time as observed in Queensland, New South Wales, Victoria and Tasmania, which is 10 hours ahead of GMT; South Australia and Northern Territories 9½ hours and Western Australia 8 hours. New Zealand is 12 hours ahead of GMT. On the other side of the world opposite the GMT line is the International Date Line where the zones meet and when one crosses this line, one moves into another day. Travellers to North America from New Zealand will know that when they cross the International Date Line they gain a day, but when returning from North America they lose a day; in other words, when crossing the date line eastwards you skip from Wednesday to Tuesday.

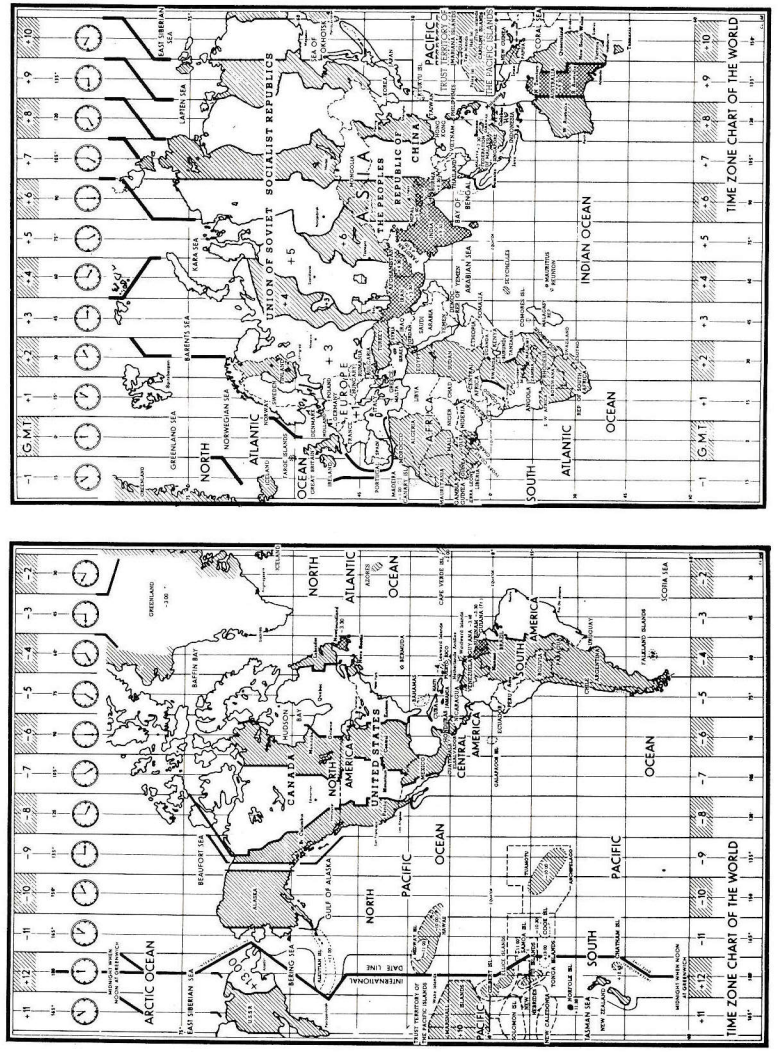
During the summer months from the last Sunday in October to the first Sunday in March, New Zealand and Eastern States (except Queensland) and South Australia advance their clocks by one hour, making them 11 hours in Sydney and 10½ in Adelaide ahead of GMT. New Zealand moves its clocks forward at the same time, to be 13 hours ahead of GMT.

Before we discuss the operation and understanding of GMT, here is a table showing the times in the three Australian Time Zones; and only once, it will be noted, that Western Australia is observing a day later than the other two states.

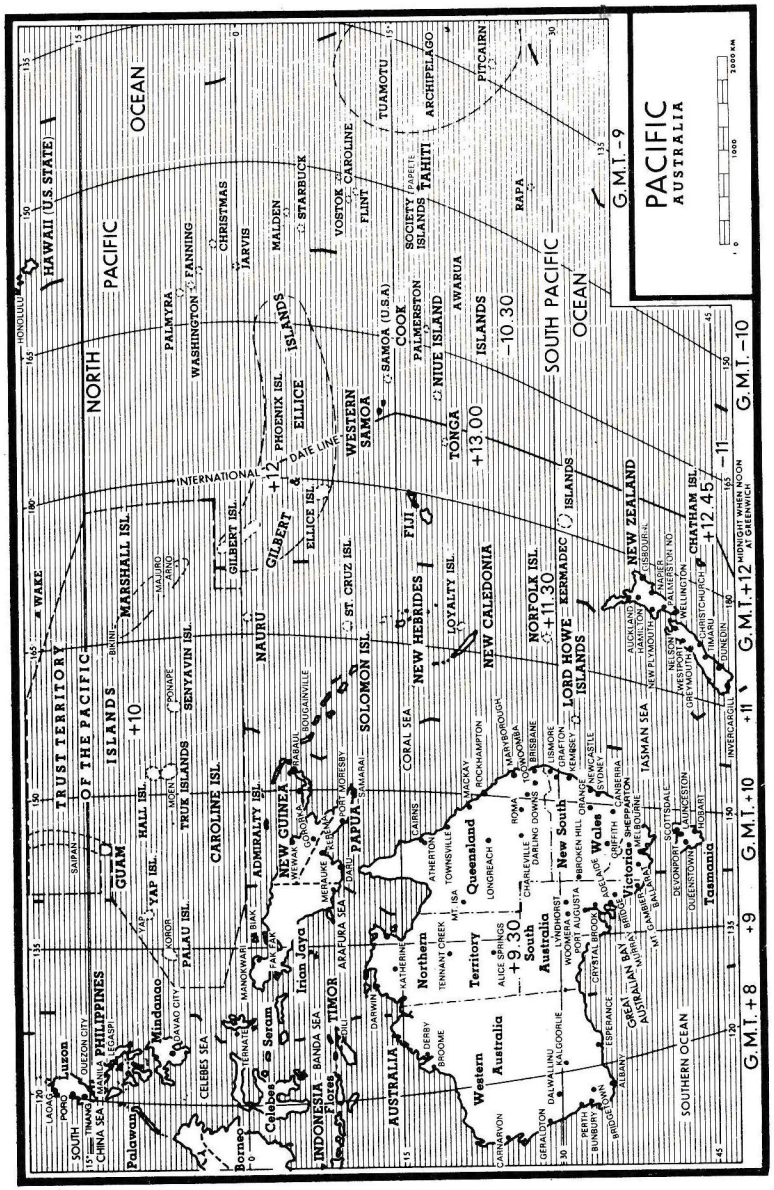
Eastern Australia	South Australia	West Australia	
1.00 a.m.	12.30 a.m.	11.00 p.m.	previous day
2.00 a.m.	1.30 a.m.	Midnight	
3.00 a.m.	2.30 a.m.	1.00 a.m.	
4.00 a.m.	3.30 a.m.	2.00 a.m.	
5.00 a.m.	4.30 a.m.	3.00 a.m.	
6.00 a.m.	5.30 a.m.	4.00 a.m.	
7.00 a.m.	6.30 a.m.	5.00 a.m.	
8.00 a.m.	7.30 a.m.	6.00 a.m.	
9.00 a.m.	8.30 a.m.	7.00 a.m.	
10.00 a.m.	9.30 a.m.	8.00 a.m.	
11.00 a.m.	10.30 a.m.	9.00 a.m.	
Noon	11.30 a.m.	10.00 a.m.	
1.00 p.m.	12.30 a.m.	11.00 a.m.	
2.00 p.m.	1.30 p.m.	Noon	
3.00 p.m.	2.30 p.m.	1.00 p.m.	
4.00 p.m.	3.30 p.m.	2.00 p.m.	
5.00 p.m.	4.30 p.m.	3.00 p.m.	
6.00 p.m.	5.30 p.m.	4.00 p.m.	
7.00 p.m.	6.30 p.m.	5.00 p.m.	
8.00 p.m.	7.30 p.m.	6.00 p.m.	
9.00 p.m.	8.30 p.m.	7.00 p.m.	
10.00 p.m.	9.30 p.m.	8.00 p.m.	
11.00 p.m.	10.30 p.m.	9.00 p.m.	
Midnight	11.30 p.m.	10.00 p.m.	

WORLD BROADCASTS

Most international broadcasting stations will be heard giving their schedules in Greenwich Mean Time, the time on which universal time calculation is based. This time, equivalent to Greenwich Mean Time in England, is 12 hours behind New Zealand Standard Time. Greenwich Mean Time is expressed in 24-hour clock, the first two figures are the hour and the last two the minutes. Thus 0950 is 9.50 a.m., at noon the clock continues so 1210 is 12.10 p.m., and at 1.00 p.m. it continues and becomes 1300, and when it is 9.00 p.m., it is reading 2100. Understanding the 24-hour clock becomes simple — you do not express time in a.m. or p.m. — and as New Zealand is always ahead of GMT, then it is simple to take off 12 hours from New Zealand Time to get GMT, or add 12 hours on when GMT is known. When it is 8.00 p.m. in NZST it is 8.00 a.m. in London the same day. Likewise when it is 2100 GMT it is 9.00 a.m. the next day in New Zealand; or at 0900 GMT it is 9.00 p.m. the same day in New Zealand.



World Map showing time zones



Map of the Pacific showing time zones

TIME EQUIVALENTS BETWEEN LOCAL AUSTRALIAN TIMES AND G.M.T. (Not including Daylight saving).

Australian Eastern Standard Time	GMT	
1.00 a.m.	1500	
2.00 a.m.	1600	
3.00 a.m.	1700	
4.00 a.m.	1800	
5.00 a.m.	1900	Previous day
6.00 a.m.	2000	
7.00 a.m.	2100	
8.00 a.m.	2200	
9.00 a.m.	2300	
10.00 a.m.	2400	
11.00 a.m.	0100	
12 noon	0200	
1.00 p.m.	0300	
2.00 p.m.	0400	
3.00 p.m.	0500	
4.00 p.m.	0600	
5.00 p.m.	0700	
6.00 p.m.	0800	Same day
7.00 p.m.	0900	
8.00 p.m.	1000	
9.00 p.m.	1100	
10.00 p.m.	1200	
11.00 p.m.	1300	
Midnight	1400	

South Australia and Northern Territory	GMT	
1.00 a.m.	1530	
2.00 a.m.	1630	
3.00 a.m.	1730	
4.00 a.m.	1830	Previous day
5.00 a.m.	1930	
6.00 a.m.	2030	
7.00 a.m.	2130	
8.00 a.m.	2230	
9.00 a.m.	2330	
10.00 a.m.	0030	
11.00 a.m.	0130	
12 noon	0230	
1.00 p.m.	0330	
2.00 p.m.	0430	
3.00 p.m.	0530	
4.00 p.m.	0630	Same day
5.00 p.m.	0730	
6.00 p.m.	0830	
7.00 p.m.	0930	
8.00 p.m.	1030	
9.00 p.m.	1130	
10.00 p.m.	1230	
11.00 p.m.	1330	
Midnight	1430	

West Australian Time	GMT	
1.00 a.m.	1700	
2.00 a.m.	1800	
3.00 a.m.	1900	
4.00 a.m.	2000	
5.00 a.m.	2100	Previous day
6.00 a.m.	2200	
7.00 a.m.	2300	
8.00 a.m.	2400	
9.00 a.m.	0100	
10.00 a.m.	0200	
11.00 a.m.	0300	
12 noon	0400	
1.00 p.m.	0500	
2.00 p.m.	0600	
3.00 p.m.	0700	Same day
4.00 p.m.	0800	
5.00 p.m.	0900	
6.00 p.m.	1000	
7.00 p.m.	1100	
8.00 p.m.	1200	
9.00 p.m.	1300	
10.00 p.m.	1400	
11.00 p.m.	1500	
Midnight	1600	

New Zealand Standard Time and GMT equivalent: (Between the last Sunday in October and the first Sunday in March it is necessary to add one hour to the NZST column, as we are then on Daylight Time.)

NZST	GMT	
1.00 a.m.	1300	
2.00 a.m.	1400	
3.00 a.m.	1500	
4.00 a.m.	1600	
5.00 a.m.	1700	Previous day
6.00 a.m.	1800	
7.00 a.m.	1900	
8.00 a.m.	2000	
9.00 a.m.	2100	
10.00 a.m.	2200	
11.00 a.m.	2300	
12 noon	2400	
1.00 p.m.	0100	
2.00 p.m.	0200	
3.00 p.m.	0300	
4.00 p.m.	0400	
5.00 p.m.	0500	
6.00 p.m.	0600	Same day
7.00 p.m.	0700	
8.00 p.m.	0800	
9.00 p.m.	0900	
10.00 p.m.	1000	
11.00 p.m.	1100	
Midnight	1200	

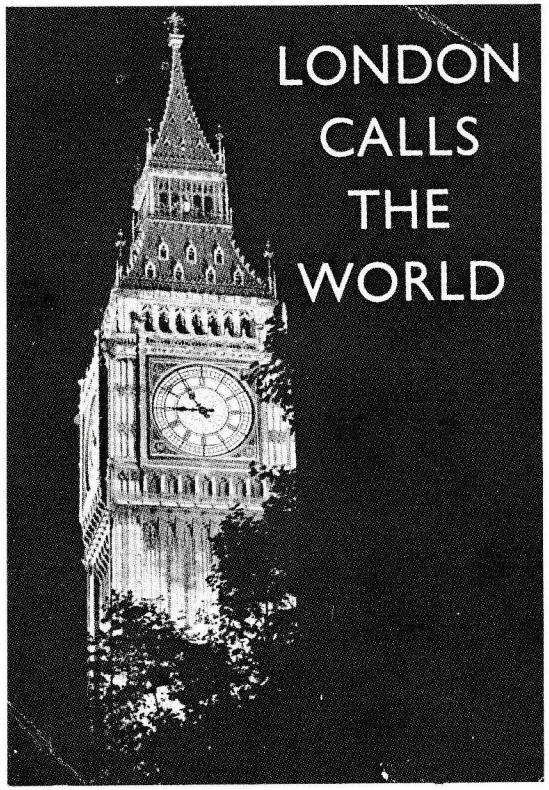
Now that we have understood the 24-hour clock and the relationship between local time and Greenwich Mean Time it is a simple matter to find that time in any part of the world. The chart given below gives the time zone of each of the world's major countries, showing that their time is either ahead or behind GMT and this is indicated by a plus (+) or a minus (-) sign. When a plus is indicated, you add on the number of hours to GMT and when a minus is indicated you take them off. Therefore, if it is 6.00 p.m. in Wellington, which is 12 hours ahead of GMT, GMT is 0600; if we look at South Africa, we find that local time is two hours ahead of GMT, so the time in Johannesburg would be 8.00 a.m. Another example is that if it is 6.00 p.m. in Wellington it is 0600 GMT; the time in California, which is the Pacific Time Zone, shows that it is - 8 hours and the local time would then be 10.00 p.m. the previous day. There are some time zones in the world which are using a 30-minute time zone. India is perhaps the best known. Though all countries are within the 24-hour day, for the sake of convenience, Tonga is 13 hours ahead of GMT, this enabling them to observe the same calendar day as New Zealand.

Many countries in this world time-chart observe Summer time in which they advance their clocks by one hour. In the Southern Hemisphere this is generally between the last Sunday in October and the first one in March, while in the Northern Hemisphere it is between April and October. When in doubt it is better to quote local standard time if you are not certain of the time being observed in any country.

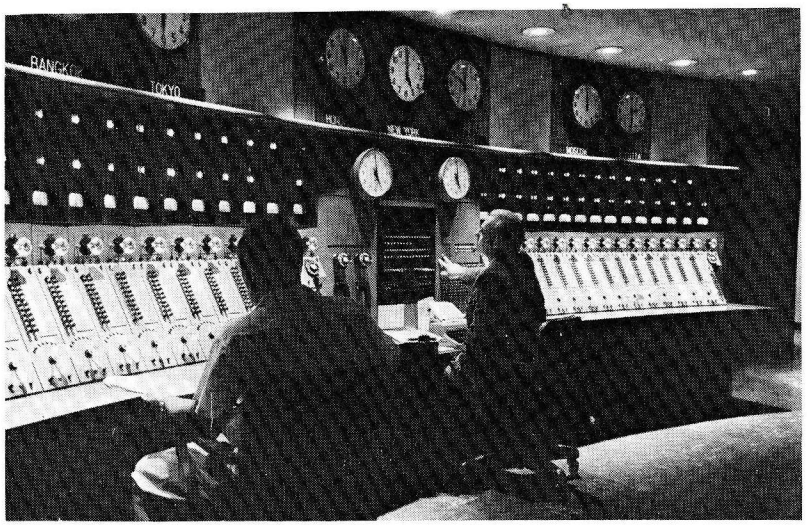
WORLD TIME IN ALL COUNTRIES

AFARS & ISSAS	+3	AUSTRALIA	
AFGHANISTAN	+4½	Victoria New South Wales	+10
ALASKA	-8	Queensland	+10
ALBANIA	+1	Tasmania	+10
ALGERIA	GMT	N. Territory	+9½
ANDORRA	+1	S. Australia	+9½
ANGOLA	+1	W. Australia	+8
ANGUILLA	-4	AUSTRIA	+1
ANTIGUA	-4	AZORES	-1
ARGENTINA	-3	BAHAMAS	-5
ASCENSION ISL.	GMT	BAHREIN	+3

BANGLADESH	+6	BRAZIL	
BARBADOS (W.I.)	-4	Eastern & Coastal	-3
BELGIUM	+1	Manaos	-4
BELIZE	-6	Acre	-5
BERMUDA	-4	BRUNEI	+8
BHUTAN	+5½	BULGARIA	+2
BOLIVIA	-4	BURMA	+6½
BOTSWANA	+2	BURUNDI	+2



Big Ben in London which sets the clocks of millions throughout the world to the correct time.



Broadcasters are aware of the time in the area to which they transmit their programmes, and this master control at the Voice of America, Washington is feeding programmes to overseas relay stations, and this control board can feed 26 programmes to the Voice of America's transmitters at the same time.

CAMEROON	+1
CANADA	
Newfoundland	-3½
Atlantic (Labrador, Nova Scotia)	-4
Eastern (Ontario) Quebec	-5
Central (Manitoba)	-6
Mountain (Alberta)	-7
Pacific (British Colombia)	-8
CAMBODIA (Kampuchea)	+7
CANARY ISL.	GMT
CAPE VERDE ISL.	-1
CENTRAL AFRICAN REP.	+1
CHAD	+1
CHILE	-4
CHINA	
People's Rep.	+8
Lhasa	+6
Urumchi	+6
CHRISTMAS ISL.	+7
COCOS (KEELING) ISL.	+6½
COLOMBIA	-5
COMORO ISL.	+3
CONGO (Brazzaville)	+1
COOK ISL.	-10½
COSTA RICA	-6
CUBA	-5
CURACAO	-4
CYPRUS	+2
CZECHOSLOVAKIA	+1
DAHOMEY	+1
DENMARK	+1
DIEGO GARCIA	+5
DOMINICA	-4
DOM. REP.	-4

ECUADOR	-5
EGYPT	+2
EL SALVADOR	-6
ETHIOPIA	+3
FALKLAND ISL.	-4
FAEROE ISL.	GMT
FIJI ISL.	+12
FINLAND	+2
FRANCE	+1
GABON	+1
GAMBIA	GMT
GERMANY	+1
GHANA	GMT
GIBRALTAR	+1
GILBERT ISL.	+12
GREAT BRITAIN	GMT
GREECE	+2
GREENLAND	-2
Thule Area	-4
GRENADA	-4
GUADELOUPE	-4
GUAM	+10
GUATEMALA	-6
GUYANA (French)	-3
GUINEA	GMT
GUINEA EQUAT.	+1
GUINEA BISSAU	GMT
GUYANA	-3
HAITI	-5
HAWAII	-10
HOLLAND	+1
HONDURAS (Rep)	-6
HONG KONG	+8
HUNGARY	+1
ICELAND	GMT
INDIA	+5½
INDONESIA	
Java Sumatra	+7
Borneo, Celebes, Bali	+8
Moluccas West Irian	+9
IRAN (Persia)	+3½
IRAQ	+3
IRELAND (Eire)	GMT
ISRAEL	+2
ITALY	+1
IVORY COAST	GMT
JAMAICA	-5
JAPAN	+9
JOHNSTON ISL.	-10
JORDAN	+2
KENYA	+3
KOREA REP.	+9
KOREA NORTH	+9
KUWAIT	+3
LAOS	+7
LEBANON	+2
LESOTHO	+2
LIBERIA	GMT
LIBYA	+2
LORD HOWE IS.	+11
LUXEMBOURG	+1
MACAU	+8
MADAGASCAR	+3
MADEIRA	GMT
MALAWI	+2
MALAYSIA	+7½
MALDIVE IS.	+5
MALI	GMT
MALTA	+1
MAURITANIA	GMT
MARIANAS	+10
MARSHALL ISL.	+12
MARTINIQUE	-4
MAURITIUS	+4
MEXICO	-6
MIDWAY ISLAND	-11
MONACO	+1
MONGOLIA	+8
MONTSERRAT	-4
MOROCCO	GMT
MOZAMBIQUE	+2
NAURU	+11½

NEPAL	+5.40
NETH. ANTILLES	-4
NEW CALEDONIA	+11
NEW GUINEA	+10
NEW HEBRIDES	+12
NEW ZEALAND	+12
NICARAGUA	-6
NIGER	+1
NIGERIA	+1
NIUE	-11
NORFOLK ISL.	+11½
NORWAY	+1
OMAN	+4
PAKISTAN	+5
PALAU	+9
PANAMA	-5
PAPUA	+10
PARAGUAY	-4
PERU	-5
PHILIPPINES	+8
PHOENIX ISL.	-11
POLAND	+1
PONAPE	+11
PORTUGAL	+1
PUERTO RICO	-4
QATAR	+3
REUNION	+4
RHODESIA (Zimbabwe)	+2
ROMANIA	+2
RWANDA	+2
SABAH	+8
ST LUCIA	-4
SAMOA ISL.	-11
ST PIERRE	-3
SAO TOME	GMT
SARAWAK	+8
SAUDI ARABIA	+3
SENEGAL	GMT
SEYCHELLES	+4
SIERRA LEONE	GMT
SINGAPORE	+7½
SOLOMON ISL.	+11
SOMALIA	+3
SOUTH AFRICA	+2
SO. YEMEN	+3
SPAIN	+1
SRI LANKA	+5½
ST KITTS	-4
ST LUCIA	-4
ST VINCENT	-4
SUDAN	+2
SURINAM	-3½
SWAZILAND	+2
SWEDEN	+1
SWITZERLAND	+1
SYRIA	+2
TAIWAN	+8
TAHITI	-10
TANZANIA	+3
THAILAND	+7
TIMOR	+8
TOGO	GMT
TONGA ISL.	+13
TRINIDAD	-4
TRISTAN DA CUNHA	GMT
TRUKS	+10
TUNISIA	+1
TURKS & CAICOS ISL.	-5
TURKEY	+2
TUVALU	+12
UGANDA	+3
UNITED ARAB EMIRATES	+4
UPPER VOLTA	GMT
URUGUAY	-3
U.S.S.R.	
Moscow Leningrad	+3
Baku Tbilisi	+4
Sverdlovsk	+5
Tashkent	+6
Novosibirsk	+7
Irkutsk	+8
Yakutsk	+9

Khabarovsk	+10
Magadan	+11
Petropavlosk	+12
Anadyr	+13
U.S.A.	
Eastern Zone	-5
Central Zone	-6
Mountain Zone	-7
Pacific Zone	-8
VATICAN	+1
VENEZUELA	-4
VIETNAM	+7
VIRGIN ISL.	-4
YAP	+10
YEMEN	+3
YUGOSLAVIA	+1
ZAIRE	
Kinshasa	+1
Lubumbashi	+2
ZAMBIA	+2

CHAPTER SIX

Tuning to foreign languages

Richard Wood in his book "Voices of the World" says that even the accomplished linguist is faced with formidable problems when he tunes through the babble of the average international broadcasting band, but the listener who has a certain familiarity with foreign languages has a distinct advantage in dealing with distant stations.

Within a short period of time, the more than casual listener will soon be able to distinguish one language from another and even understand certain words and phrases. With experience the listener will soon learn to identify also the various accents and dialects and be able to tell Australian English from South African English, or the stereotyped form of English adopted by Radio Peking. In terms of actual use here are the most important languages for the shortwave listener. Use this list as a guide in planning any future language courses or linguistic studies. Shortwave listening has been underrated as a means of gaining valuable experience in foreign languages.

English: At least two-thirds of the major international broadcasters beam programmes daily to Australasia in the English language, and there are numerous English language transmissions from such countries as Japan, India, United Arab Republic, Ecuador, China and many others.

French: The French language is of primary importance to the listener attempting to DX the African continent. Most shortwave stations in such countries as the Ivory Coast, Mauritania, Togo, Central African Republic and Senegal devote large segments of their daily schedules to the French language so the DXer whose high-school-taught French is not entirely forgotten.

Arabic: Another language of great importance in international radio is Arabic - the unmistakable powerful language of many countries in Africa and the Middle East. Arabic is broadcast by many international stations beaming to that vital area where the

These two visiting nurses from Iran and Korea listened to news in their own language which had been recorded on tape and kept them in touch with home.

distribution of multi-band transistorized radio receivers has almost reached saturation point.

The Middle East has always been highly radio-conscious and the BBC began broadcasting in Arabic before it introduced services in any of the more common European languages.

Indonesian: Most domestic broadcasting in Indonesia is on shortwave. Indonesia is highly decentralized with almost all of the regional shortwave broadcasting stations loosely affiliated with Radio Republik Indonesia relaying only an occasional news broadcast from the central station in Jakarta. Almost all Indonesian regional station programmes are of local origination and the local station identification may be heard at regular intervals.

Basic Indonesian is a language which most people who are born and raised to speak English find clear and easy to understand. Indonesian is perhaps the only Asian language with which the average shortwave listener need have any depth of familiarity - although, obviously, a knowledge of other Asian languages always helps.

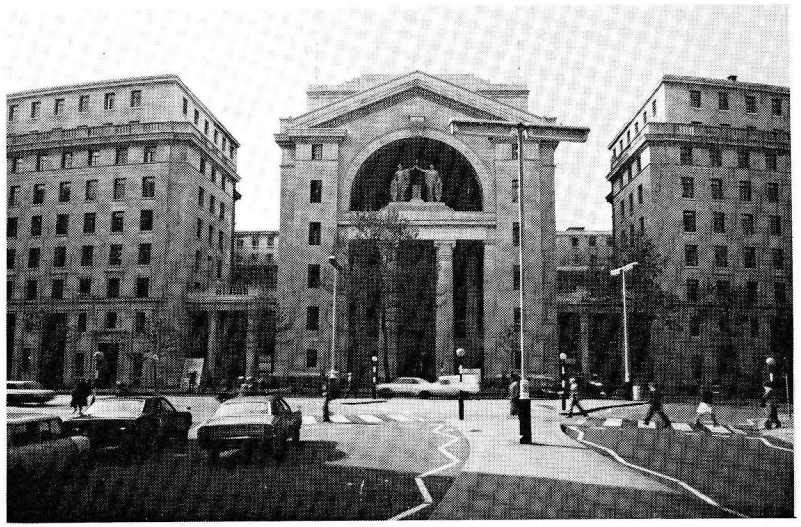
Other Languages: There are dozens of the world's languages broadcast on shortwave for local and regional audiences, but the number for the international audience is increasing and Radio Moscow, broadcasting in 84 languages, leads the world. Radio Peking has transmissions in 43 languages; West Germany and BBC 37, and Voice of America 36.

Some of the languages heard are beamed to Eastern Europe which may mean that deliberate jamming interrupts good reception. Others transmitted, such as Spanish and Portuguese in broadcasts to Latin America, are giving better reception than the normal transmission for listeners in Europe.

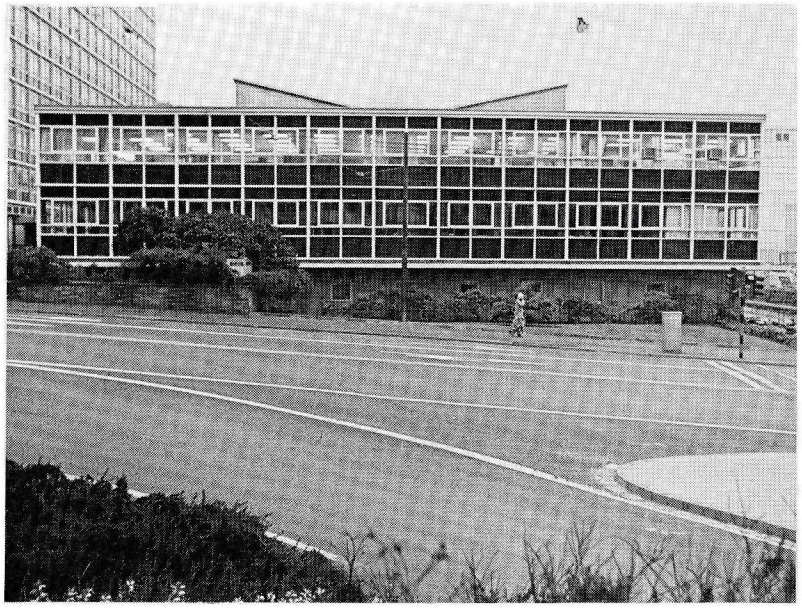
The major languages of French, German, Spanish and Russian are carried by dozens of stations but at the end of this chapter I have limited them to times and frequencies most suitable for listening in Australia and New Zealand.

The schedules of these language broadcasts are fairly stable, but frequencies can change due to seasonal and propagation difficulties. The information is given in Greenwich Mean Time, which topic was discussed in Chapter 5.

It is not possible to list every station broadcasting in the



Bush House, London the home of the BBC External Service from which originates broadcasts in 37 languages.



Broadcasting House, Wellington, the home of Radio New Zealand which carries programmes to the Pacific on shortwave in Cook Island, Maori, Tongan, Niuean, Samoan and Tokelauan.

languages covered, but I have stressed in the main the homeland and then two or three alternative signals which should provide regular reception throughout the South Pacific.

I acknowledge to the World Radio and Television Handbook and the BBC Monitoring Service their help in providing this coverage of language broadcasts, as well as to the many stations concerned for providing me with their latest schedules, to which I have added my own listening observations taken over several months of recent monitoring.

LISTENING TO OUR ASIAN AND PACIFIC NEIGHBOURS

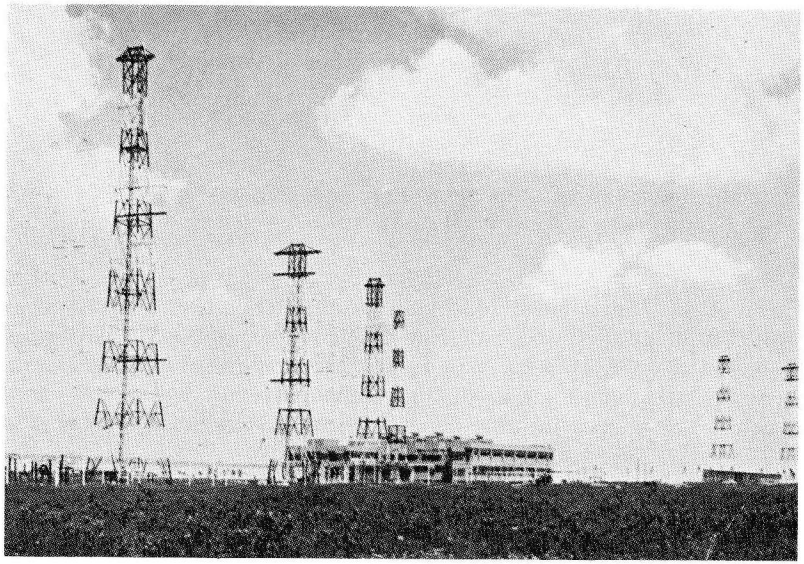
The vastness of Asia and the Pacific, and the combined fact that such a variety of signals on shortwave can be received from all the countries in the area, makes this the most fascinating region to DX.

The language difficulties are many; the lower frequency bands are used primarily for the domestic services, and the higher frequencies for regional and international broadcasting. This is particularly so

on the Asian mainland. Listener reports to stations in many cases have to be presented in the local languages in which the stations' logs are written up, otherwise the reports cannot be checked against transmissions.

To understand the operation of Asian stations, we must remember that basically they are for the reception by the local population on the lower frequency bands, and to give an international service on the higher frequency bands. This is typical of Japan, North and South Korea, India, Pakistan, Thailand, Malaysia, Burma, Iran, Iraq and many other countries. In the South Pacific, most of its countries are interested in serving the local audience, and only Australia and New Zealand have international services.

A closer look at the station finds, firstly, that they mainly have a network announcement such as NHK-Japan, AIR-India, KBS-South Korea, BCC-Taiwan, RRI-Indonesia, ABC-Australia, RNZ-New Zealand. This identification call is frequently heard from these stations when relaying their domestic services. The major language difficulties for new listeners is in distinguishing between Japanese, Chinese and Korean; and then in the South Asian area in Laotian,



The transmitting station at Noblejas in Spain, which carries a daily service in Spanish to Australia.

The Solomon Islands Broadcasting Service is well received with its programmes in Pidgin from its studio buildings in Honiara.

Cambodian, Vietnamese, Malaysian and others which form another group; and then Hindi, Urdu, Russian, Persian and, later, Arabic as we move westward across Asia. Secondary languages such as French can be heard from Cambodia, New Caledonia and Tahiti and other small possessions in the Pacific. Spanish is heard from the Philippines; Maori, the native language of New Zealand, from the Cook Islands; and pidgin-English from the Solomons, New Hebrides and Papua-New Guinea.

To get acquainted with languages, listen to the Voice of America or the BBC when they announce in English on the hour or half-hour that the language to follow is .... and try to pick out features which

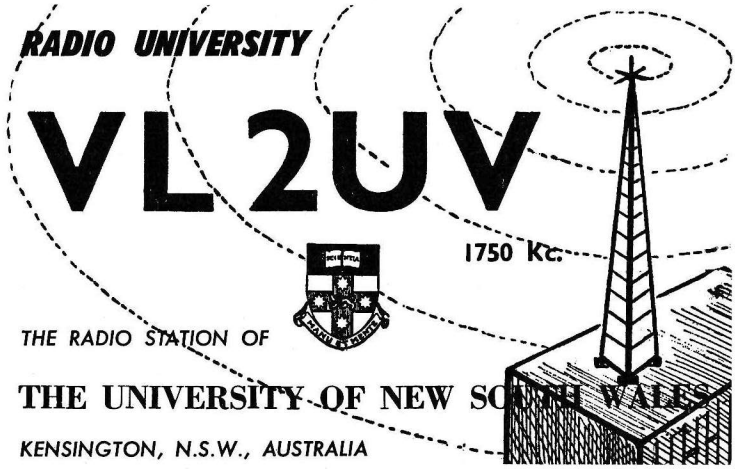
enable you to recognize by ear and style the various peculiarities about the language. These will enable you to listen to a foreign language which is given by name, and try to pick out the characteristic points so that you can recognize it when you hear it again.

NEWS FROM HOME

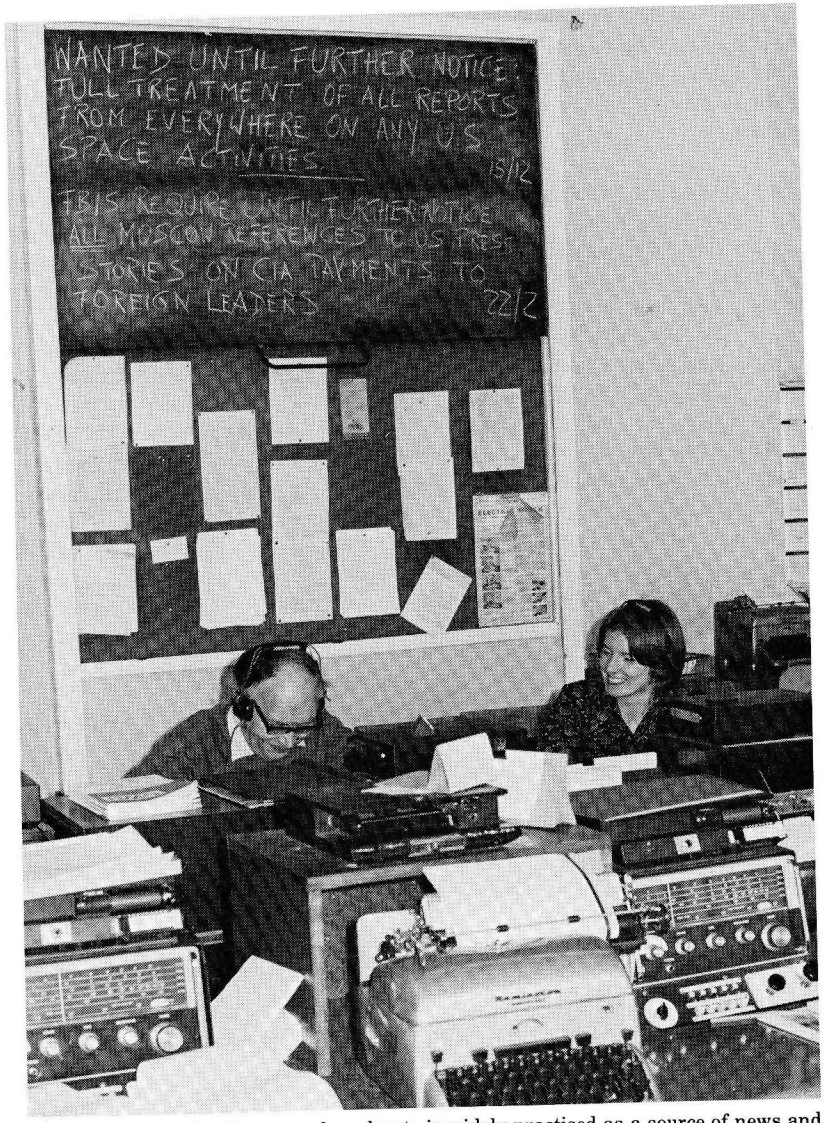
There will be many readers of this handbook who are not New Zealanders or Australians by birth, have come to these countries over the past years, and desire to maintain a link with their homelands in their native tongues.

At the end of this chapter I deal with broadcasts in over twenty languages from the many countries which are heard in the South Pacific. Many of these sessions are on a daily basis and are beamed to this area so that listeners get the very best reception on the best frequencies at easy listening times. There are also several stations now within Australasia which broadcast in many of the European and Pacific languages.

There are also the many visitors to whom the shortwave listener can be of great help, as he can tune in his receiver to enable these visitors to hear a little of what is going on back home. In this chapter I illustrate this point with a photograph of two visitors, one from Iran



Universities throughout Australia have their own broadcasting stations either on mediumwave or FM, and these provide lessons in many languages. The pioneer station is VL2UV operated by the University of New South Wales, Sydney.



Monitoring of foreign language broadcasts is widely practised as a source of news and information which is not often available due to censorships to the listeners in the outside world. This photograph shows BBC Monitoring Service at Caversham Park near London.

and the other from Korea, both on nursing scholarships, who came to my home each week to hear news in their own language, and this act of keeping them in touch with happenings from their homeland overcame most of their difficulties in trying to keep up with the news.

Keith Glover of Radio Australia was recently on a world tour in Germany visiting broadcasting organizations. While visiting Deutsche Welle in Cologne he had a telephone call in excellent English from one of his long-standing listeners who tuned regularly to his sessions on Radio Australia. When the German listener was told that Keith and Gwen Glover were going to his home town he was jubilant. He arranged the necessary hotel accommodation, but when the train pulled into the station Keith Glover suddenly realized that no arrangements had been made for them to recognize each other. As the other passengers got off at the station they all drained down the great entrance hall and the Glovers were left on the platform. They took their baggage and moved down the stairs but suddenly came to a stop as, wafting up this great canyon of staircase, was "Waltzing Matilda" followed by "Jacko the Kookaburra", Radio Australia's two identification signals, and there was his German friend holding up in his hand a small tape recorder and saying "It is you Mr Glover, I think"?

Much knowledge of the world is gained by shortwave radio, and in the fields of geography and world events the shortwave listener is away out in front. Typical was an example in which I entered New Zealand's largest radio quiz some years ago called the "Sixty-four Hundred Show", and chose the category - "Capital Cities of the World". The final question was to name the capitals of ten South American republics. With a picture of the map of South America in my mind it was a simple matter to move down the West Coast giving those capitals, next those of the two countries in the centre and round it off with those of Uruguay, Brazil and Argentina. In this question there were two catch items, - the capital of Bolivia is Sucre though La Paz is the largest city, while Brazilia had taken over from Rio de Janiero as the capital of Brazil. That was truly a memorable night when shortwave listening prevailed and won for me a glamour prize.

FOREIGN LANGUAGE BROADCASTS

News from home to many New Zealanders and Australians means news from many countries, and this list covers the languages spoken or understood by residents of both countries. Ethnic transmissions are increasing within our countries, but broadcasts

from overseas are beamed to the South Pacific and more than 20 languages are available on shortwave. This list gives the principal languages, a selection of stations carrying the programmes and on the frequencies best received in this area.

City and Country	Times (GMT)	Frequencies (kHz)
ARABIC		
Cairo, Egypt	0700-1500	6170
	0600-1900	15475
	1800-2355	12005
Kuwait, Kuwait	0400-0735	6055
	1815-2115	11990
Baghdad, Iraq	0228-0605	6095, 7196, 9652, 17770
London, England	0345-0545	7325, 9825, 11740
	1800-2000	7140, 9825, 12040
CHINESE		
Peking, China	2000-1735	6665, 7504, 11290
Taipeh, Taiwan	2045-0130	7150, 9630, 11970, 15280
London, England	2230-2300	7180, 9825, 11865
	1000-1030	9825, 11955, 18080
Melbourne, Australia	1030-1200	11760, 15105
	1300-1430	11760, 15130
Moscow, USSR	1000-1030	7055, 7135, 9685
CZECH		
Prague, Czechoslavakia	0800-0830	11855, 17775, 21700
	2230-2257	6055
London, England	0515-0530	6150, 7260, 9690
Washington, USA	0530-0545	6080, 9615
Munich, Germany	0357-0042	6105, 9595, 11885
DANISH		
Copenhagen, Denmark	1100-1155	15165
Moscow, USSR	2030-2100	5980, 6020
DUTCH		
Hilversum, Holland	0630-0725	9630, 9715
	0830-0925	9770
	1030-1125	17810, 21480
ESPERANTO		
Vatican City	0615-0630	THUR 6190, 9625, 11740
ESTONIAN		
Tallinn, Estonia	2135-2200	6080
Munich, Germany	0400-0430	5955, 6170, 7155, 9715
	2100-2200	5955, 6170, 7155, 9715
FRENCH		
Paris, France	0600-0800	9525, 11705, 11735
Berne, Switzerland	0800-0830	9560, 11780, 15305
Melbourne, Australia	2400-0100	15160, 17795
	0500-0600	15160, 15320, 17795
GERMAN		
Cologne, Germany	0600-0950	9735, 11795, 17845
Berne, Switzerland	0830-0900	9560, 11780, 15305

GREEK		
Athens, Greece	2100-2150	6140, 9655, 9760
	0900-0950	9655, 15160
HINDI		
Delhi, India	0300-0415	15140, 17705
London, England	0140-0200	9825, 11955, 15380
Karachi, Pakistan	0830-1000	15520, 17750
ITALIAN		
Rome, Italy	0830-0930	9580, 11810, 15340
	2030-2130	7290, 9575, 11800
Berne, Switzerland	0730-0800	9560, 11780, 15305
Vatican City	2045-2100	6210, 7250, 9645
LATVIAN		
Munich, Germany	0500-0530	5955, 7180, 9715
	1900-2000	5955, 7180, 9715
Washington, USA	1600-1630	6160, 7165, 9530

Rudy Munir of the Indonesian staff of Radio Australia.

Kathy Sakias of the Papua New Guinea section of Radio Australia.

LITHUANIAN		
Vilnius, Lithuania	2300-2330	9710
Rome, Italy	0445-0505	6075, 7275
Washington, USA	1700-1730	6160, 9530, 11905
MALTESE		
Rome, Italy	1430-1445	7235, 9710
London, England	1650-1655	11680, 15435
PORTUGUESE		
Lisbon, Portugal	0400-0600	6025, 6185, 9740
	0930-1100	21735
London, England	2030-2115	9825, 11715
	2200-0015	9600, 9765, 11820

RUSSIAN		
Moscow, USSR	0930-1000	5935, 7290, 9685
	1200-1230	11830, 12020, 15455
London, England	0345-0400	7210, 7285, 9750
	1900-1930	9915, 11925, 15310
SPANISH		
Madrid, Spain	0730-1100	9520, 9790, 11730
	2245-0400	9360, 9530,11945
London, England	0015-1415	9600, 9765, 11820
TURKISH		
Ankara, Turkey	0355-2130	6185, 11955, 11965
London, England	0515-0530	7120, 7250, 9750
Ukrainian	1815-1900	7235, 9635, 11945
Kiev, USSR	2030-2100	7205, 7300, 7390
	0330-0400	9610, 11790, 12020
YUGOSLAVIA (MACEDONIAN-SERBO CROAT)		
Belgrade, Yugoslavia	1400-2300	7200, 9505
Moscow, USSR	1800-1830	5940, 7310, 7390
London, England	0500-0515	9750, 11945, 15390
	1730-1815	9635, 11945, 15390
Rome, Italy	1500-1520	5990, 7290, 9575
	1910-1930	5990, 6050
Washington, USA	2100-2130	9540, 9770, 11915

CHAPTER SEVEN

Propagation of shortwave

The range of frequencies available to long range broadcasters is limited by two factors, known respectively as the maximum usable frequency (MUF) which determines the upper limit, and the absorption limiting frequency (ALF) which fixes the lowest usable frequency for shortwave broadcasting. Both these factors vary according to ionospheric conditions - for example, in periods of high sunspot activity the MUF goes higher - but in general the changes in the ALF are not significant enough to warrant special attention on the part of international broadcasters. However, station engineers pay close attention to variation in the MUF, and as the maximum occurs in the 11-year sunspot cycles, many stations move up into the higher frequencies which become available for use at this time, since these frequencies are relatively uncluttered and propagation close to the MUF is more efficient.

At one time the choice of frequencies by international broadcasters tended to be haphazard, with several stations broadcasting on the same overlapping frequencies, causing mutual interference to the disadvantage of all concerned. In more recent years there has been widespread acceptance of a plan drawn up by the International Frequency Registration Board (IFRB) of the International Telecommunication Union (ITU). This requires every shortwave station of signatory countries to register in advance with the IFRB its planned transmission schedule and frequencies to be employed. The IFRB then points out any instances where interference is likely to be experienced, and suggests alternative arrangements which offer minimum inconvenience to all parties.

SUNSPOTS AND THE IONOSPHERE

An understanding of the effects of ionospheric changes on long distance radio reception, and what factors operate to bring about

The young Marconi photographed shortly after his arrival in England in 1896, with his apparatus for "telegraphy without wires."

such changes, is useful knowledge for the DX listener.

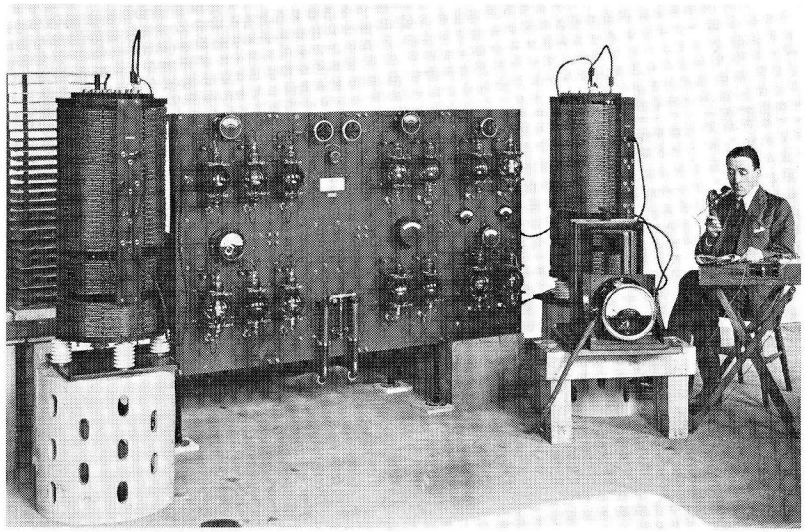
The ionosphere completely surrounds our planet and consists of layers of ionised gases. It has been established that these gases (mainly oxygen, nitrogen and the rarer gases which make up our atmosphere) are ionised by radiation from the sun. Ionisation occurs when atoms become electrically charged, either through a deficiency in their normal quota of electrons (positive ions) or a surplus of electrons (negative ions). In the case of the ionosphere, ions are formed by radiation from the sun (principally from ultra-violet and X-rays). The number of ions formed—and consequently the thickness of the ionospheric layers—at any point in the atmosphere, depends on the degree of radiation received at that point.

During daylight hours there are four main layers: the D layer, which extends from about 50 km to 80 km above the surface of the earth; the E layer, extending from 80 km to 145 km; the F1 layer, which begins slightly above the E layer and extends to about 240 km; and the F2 layer, the upper limit of which varies from around 320 km to 490 km, according to season. All the layers of the ionosphere go

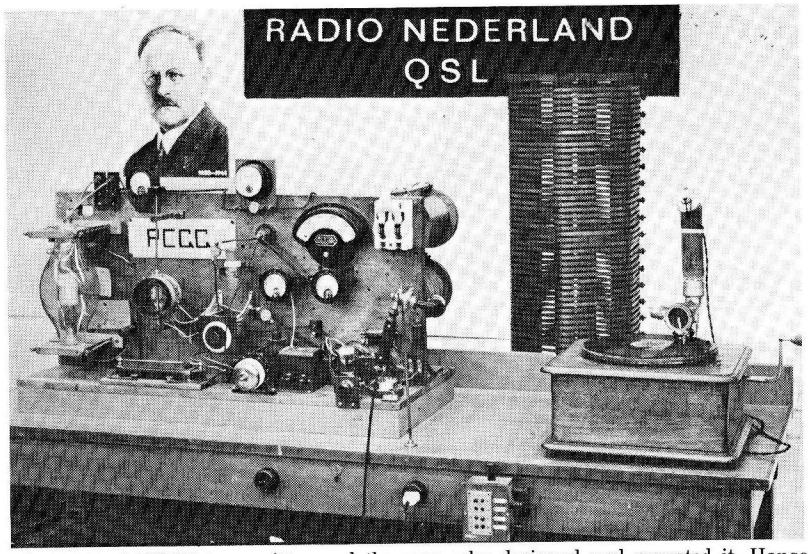
through a daily cycle, reaching maximum intensity around noon (the different layers reach their maximum ionisation at slightly different times) but whereas the D and E layers virtually disappear during the hours of darkness because of recombination of the electrons, the F layers persist from sunset to dawn. Were it not for this fact radio communication, except over line-of-sight paths, with any region in darkness would be impossible. These layers are further discussed in Chapter 9.

The amount of radiation received by the ionosphere from the sun varies continually as the result of various natural phenomena, such as the elliptical orbit of the earth around the sun which results in the earth being five million km nearer to the sun during our summer; the rotation of the earth on its axis which results in the daily cycle of change already described; irregular events, such as solar eclipses; and the 11-year sunspot cycle.

The changes in the number of sunspots have a dramatic effect on the ionosphere. Current theories suggest that the disturbances on the surface of the sun which give rise to sunspots cause the formation of ions on a massive scale, and that vast numbers of liberated electrons shoot across space to bombard our ionosphere. The resulting



An experimental wireless telephony transmitter at the Chelmsford works of The Marconi Company which inaugurated the world's first broadcast news service in February 1920.



The original PCGG transmitter and the man who designed and operated it. Hanso Idzerda. This transmitter first operated in Holland on November 6, 1919.

formation of ionised particles in the upper ionosphere makes it possible to obtain better reflection of radio waves at higher frequencies than normal. For this reason international shortwave broadcasters make much greater use of the higher frequencies in the 13- and 16-metre bands during periods of high sunspot count.

On the other hand, during sunspot minimum periods the shortwave frequencies in the lower 31-, 41- and 49- metre bands become greatly over-crowded as shortwave broadcasts all over the world are forced to abandon the higher frequencies.

In long-range radio communication the shortwaves travel around the world in a series of skips, reflecting successively from the ionosphere and the surfaces of the earth. Were it not for the ability of the ionosphere to act as a reflector in this way, the shortwaves which impinge on it would simply travel out into space, and radio communication around the earth would be impossible without the aid of man-made reflectors.

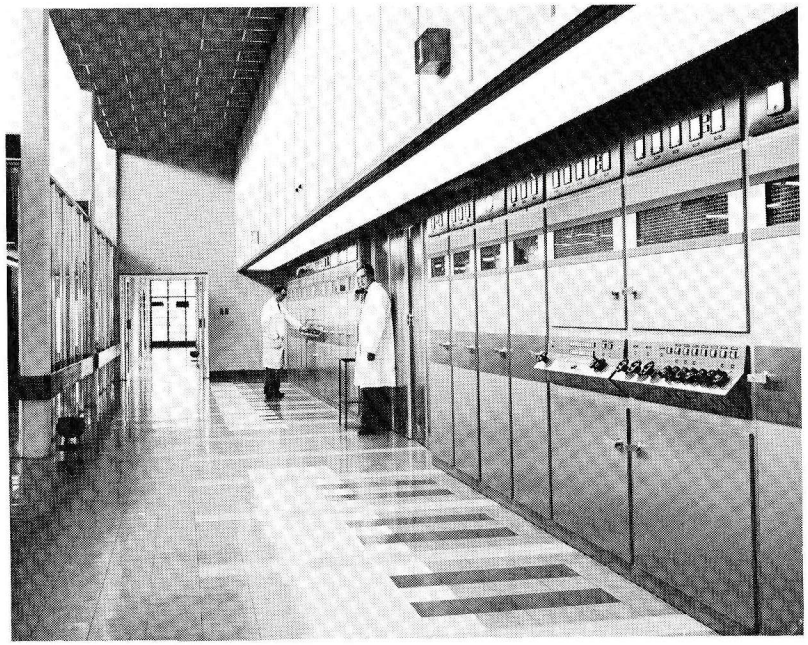
As a shortwave skips back and forth between the ionosphere and the earth it becomes attenuated (weakened) in the process. Signals reflected by the lower D and E layers quickly become attenuated to

the point where they cannot be received beyond a limited service area. The higher frequencies used by shortwave broadcasters can penetrate the D and E layers and reflect from the F layer, but they become attenuated in the process. For this reason signals travelling via the 'path of darkness' are received at a better signal level, since the D and E layers do not exist on the night side of the earth.

A BRIEF HISTORY

Marconi, an intense young man privately educated in Italy and England, at an early age manifested a great interest in the science of electricity. He came from a wealthy family and had both the leisure and the money for experimentation and equipment. In addition, his circle of acquaintances included many science enthusiasts.

In his teens Marconi conceived the idea of the possibility of wireless telegraphy. Even at that time his life's ambition was to



Radio South Africa has recently installed three transmitters of 500kW and our photo shows two of the 250kW transmitters which are also in operation.

perfect and establish wireless communication throughout the world. His only fear was that other scientists might reach the goal before he did.

Young Marconi set up his first experimental stations in his father's garden. He built his own sending and receiving apparatus and with this equipment he was able to become one of the first to transmit Morse code via wireless waves over several miles. The Italian youth discovered the great secret of wireless telegraphy, which was the connecting of one side of the generator to the earth and the other side to a wire called an antenna, and then tuning the antenna to the wavelength of the generator.

Convinced that the discovery was more than just a laboratory toy, Marconi moved to England in 1896 and formed a company, after taking out a patent for his invention. Progress was rapid and in 1899 he was sending messages across the English Channel. Two years later he telegraphed the letter "S" from England to Newfoundland. This was the first successful trans-Atlantic radio transmission. In 1901 he succeeded in sending signals across the Atlantic Ocean and in the following year actual trans-Atlantic messages were exchanged. Marconi shared the Nobel Prize in physics in 1909 with Karl Ferdinand Braun, who also had helped to pioneer radio.

CHAPTER EIGHT

Frequency ranges

The frequency range used by broadcasting stations can be divided into three groups; long wave, mediumwave and shortwave.

Long Wave: The longwave band group covers 150-285kHz and is widely used by European countries to repeat their mediumwave programmes or, in some cases, to operate another service. The power on this longwave band is normally very high and reception is possible around dawn in New Zealand during the equinoctial period.

Medium Wave: The frequency range was 530-1600kHz with a 10kHz separation between stations, but as from November 23, 1978 Australasia adopted 9kHz separation and the band now covers 531-

W4XA
THE NATIONAL LIFE AND ACCIDENT INSURANCE CO., INC.
NASHVILLE, TENNESSEE U. S. A.
W4XA Operates on a Frequency of 26.15 Megacycles, With a Power of 1000 Watts
THE WORLD'S FINEST MUSIC BY THE WORLD'S FINEST ARTISTS
WSM • 650 KILOCYCLES • AMERICA'S TALLEST RADIO TOWER

The highest frequency used by a shortwave broadcasting station was 26150kHz which was operated by W4XA for experimental broadcasts in the late 1930's.

1602kHz. Only in North and South America will the 10kHz separation still be used.

Short Wave: This is the band-group which covers a variety of services and extends from 1600 to 30,000kHz. By the 1959 Geneva Regulations, the regions of operation and the frequency ranges for the world were assigned. Australia, New Zealand, Asia and part of the Pacific are in Region 3. The frequency ranges assigned to this region for broadcasting in tropical and international bands and for the radio amateurs are as follows:

Region 3	Metre Bands	Service
1800-1900	160	Amateur
2300-2495	120	Broadcast tropical
3200-3400	90	Broadcast tropical
3500-3900	80	Amateur
3900-4000	75	Broadcast
4750-4995	60	Broadcast tropical
5005-5060	60	Broadcast tropical
5950-6200	49	Broadcast
7000-7100	40	Amateur
7100-7300	41	Broadcast shared with Amateur
9500-9775	31	Broadcast
11700-11975	25	Broadcast
14000-14350	20	Amateur
15100-15450	19	Broadcast
17700-17900	16	Broadcast
21000-21450	15	Amateur
21450-21750	13	Broadcast
24600-26100	11	Broadcast
28000-29700	10	Amateur

The frequency range of shortwave stations on the lower frequencies is mainly allotted to stations in the tropicals and these are of local-type programming—although some are of regional programmes—and are mainly in Latin America and Africa. Moving into the international bands there is a predominance of world-wide broadcasting on these frequencies. On the higher frequencies this type of transmission is affected by sunspots and the 13 and 11 metre band are more of seasonal use in their operation.

The Future: It is obvious that the shortwave bands are overcrowded and more frequencies must be found. This is now a brighter possibility because of the fact that many of the utilities and other users of the shortwave frequency ranges have moved into satellite transmission, thus leaving a vacuum to be filled in in certain parts of the shortwave spectrum. This is the position as far as

broacasters and the radio amateurs are concerned. The radio amateurs throughout the world are pressing for the retention of their present bands and an increase in the bands which they are sharing with other users. For instance, the 40 metre band is allocated for temporary use to radio amateurs between 7100-7300kHz in region 3 on a non-interference basis to broadcasting services. The radio amateur fraternity is therefore looking forward to a permanent increase in their band allocation and even the creation of new bands at the forthcoming Conference.

The international bands are now being used by more than twice as many countries as they were in 1959 and it is estimated that to satisfy the present needs the bands would have to increase from 2350 to 4700kHz in total width. The power of the shortwave stations has also increased rapidly in the past 20 years: at the time of the 1959 Conference there were only about 20 250kW transmitters in operation but today there are over 300 transmitters in use with powers ranging from 250kW to 1000kW. It is expected that over 150 nations will take part in the 1979 Conference as against 83 who signed the 1959 Geneva Regulations.

Planning frequencies are a continuous subject of discussion amongst broadcasters and here Jim Vastenhoud (Radio Nederland), Arthur Cushen (Radio New Zealand) and Arne Skoog (Radio Sweden) talk over this topic.

The frequency assignment team of Radio Nederland are Tineke Francois, Yvette Senn van Basel and Ben Loog.

Conference Plans: Already some organizations have released their proposals to be placed before the Conference in Geneva in September 1979 and in all cases an extension of the international shortwave bands is being promoted. The BBC has given its frequency plan, and a meeting in Vienna which was attended by 14 broadcasting organizations put into some concrete form their ideas for the new allocations. The proposed bands would cover the following frequencies:

kHz	Metre Band
3900-4060	75
4750-4995	60
5005-5060	60
5740-6200	49
7100-7500	41
9400-9900	31
11500-12025	25
13600-14000	22(New)
15110-15700	19
17500-17900	16
21450-21850	13
25600-26100	11

From the listeners' point of view, only the 11 metre band would remain unchanged. The main points are the elimination of radio amateurs from the 41 and 75 metre bands, the introduction of a new 22 metre band, and the allocation of international broadcasting to the 60 metre band. There has been opposition to the proposed use of the 60 metre band by international broadcasters by many third world countries, and, at a recent Conference in Algiers, the participating nations made it plain that they wanted this band retained for tropical broadcasting. This would also be the wish of the majority of listeners as it is this band that provides reception of outstanding low-powered signals from Africa and Latin America. Many of these stations operate solely on this band and have no other transmission of their programmes, while others which operate on mediumwave use this band not only for shortwave transmission but often also as a link between studio and their mediumwave transmission outside the city limits. If this band was open for world-wide transmission all these interesting signals would be buried under the high-powered 250kW and 500kW transmitters in the European countries.

The satellite transmissions which have taken away many of the former users of high frequency shortwave transmissions, operate on bands beyond the scope of the radio listener and have transmissions which receive signals from the ground on 6gHz (6 billion cycles per second) and re-transmit them back to the ground on frequencies in the 4gHz band. In the early days of satellite transmission the first Russian Sputnik broadcast on merely 20mHz and the signal could be received on any shortwave receiver. I received a verification of that transmission.

Understanding Frequency Schedules: The broadcasting organizations put out their transmission schedule in many ways, but increasingly make use of a graph, and I have reproduced the transmission graph from the BBC in London for listeners in Australia and New Zealand. This graph indicates across the top the hours in GMT, and down the left-hand side the frequency in mHz. The solid part across the graph indicates the length of the transmission on that frequency and if the broadcast is not direct from London but is carried by a relay station, this is indicated at the end of the line: for instance "T" means that the transmission on that frequency originates from the British Broadcasting Corporation Far East station at Singapore. The other indication is "C" which denotes

Preparing weekly reception graphs for the BBC is one of many services provided by the writer and here in our office, one of the girls compiles a graph to be sent to London and this work enables the BBC to give a better transmission for its listeners in Australasia.

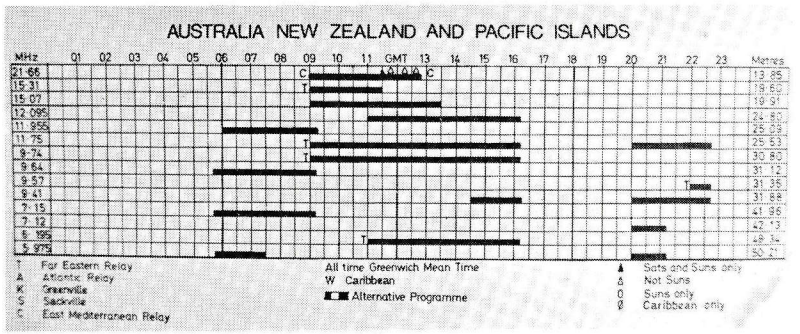
the broadcast originates from the relay station in Cyprus.

The schedule for Radio Australia is made in a similar pattern, but as well the indicating line showing the length of the transmission is broken up into several patterns, and these patterns indicate the language being broadcast during that time period. The Voice of America in their Spectrum Occupancy publications - which show the world-wide picture of transmissions on every frequency in the international band for the whole 24 hours - indicate the country of origin, the power of the transmitter and the area to which the broadcast is being directed.

Choosing Frequencies: With the frequency range available on the various shortwave bands, many of the long-established stations continue to use the same channel: for instance, the BBC was assigned GSA 6050, GSB 9510kHz inter alia in 1932, and still uses these frequencies. Most international stations, though it is not binding on them to leave free these frequencies, clearly realise that these are long-established frequencies of the BBC. It is therefore understandable that new countries find it difficult to find a suitable

outlet on which to carry their shortwave broadcasts, and new stations have to apply to the IRFB along with all other broadcasters for their allocation four times a year. In this regard, the radio listener can be of great help as plans often look workable on paper but in practice they are not. A simple example was a recent IRFB allocation of Radio Canada broadcasting to Australia on 9630kHz with Radio Sweden broadcasting to Eastern Europe on the same channel. It appeared on paper that there would be little interference, but in practice this was not so and both transmissions severely interfered with one another. I was able to advise Radio Canada to drop to 9625kHz and, as a result, both stations were then heard at good strength without causing interference to each other. This is just a simple explanation of what shortwave listeners can do in trying to find clear channels for broadcasters to provide an adequate service for listeners in Australasia.

I have mentioned frequency occupancy of the entire shortwave spectrum: every month I prepare a graph showing the complete band over a given period and an indication of all the stations heard during that time period with their location, strength and length of transmission. These bandscans are of great value to world-wide broadcasters as they allow them to see at a glance how their signals rate against their competitors and also what frequencies are free to use in that band.



Most international broadcasters now publish their schedules in graph form and this one shows the BBC transmissions to Australasia. Across the top are the hours in GMT and down the left hand side the frequencies in mHz. The length of the dark line shows the hours of transmission while the initials indicate that the programme is being broadcast through a relay station.

Jamming Interference: All shortwave listeners at sometime have heard a roaring noise interspersed with Morse; this is jamming. Jamming on the various bands not only blocks out signals beamed to communist countries but also spoils reception of nearby stations. The Helsinki Conference, which had the agreement of the European powers, attached special emphasis on freedom of information and travel and the ending of deliberate interference to radio broadcasts. So far the Russians have not lived up to the agreement, continuing to jam Radio Liberty and Radio Free Europe as well as other broadcasts from Western Europe which are the subject of selective jamming. The international jamming of broadcast signals is almost as old as broadcasting itself; the first concerted effort at jamming was undertaken by Germany's Third Reich against the BBC and other Allied broadcasting stations during World War II, but the techniques were, by today's standards, unprofessional and largely ineffective.

Jamming became a serious problem during the so-called Cold War. At that time the Soviet Union undertook a campaign to render all Western European broadcasts inaudible within the borders of the USSR and in all of the satellite nations then under the Soviet control. The principal sufferers from the jamming were the Voice of America, Radio Free Europe, Radio Liberation, BBC, Canadian Broadcasting Corporation, Vatican Radio, Spanish National Radio and the Voice of Israel. Although no one knows for sure, authorities speculate that there are at least 2,000 full-time jamming transmitters in the Soviet Union. Not all of these transmitters are active against shortwave broadcasts since many are used to jam frequencies in the mediumwave bands.

The Helsinki Conference gives new hope to shortwave listeners who have endured this deliberate jamming for many years resulting in the spoiling of otherwise good reception. When a jammer transmitter spreads across several other stations which are not intended to be jammed, all suffer. The action of jamming has long been known to be a political decision, and history has shown that on occasions when jamming was reduced it was in response to a political detente.

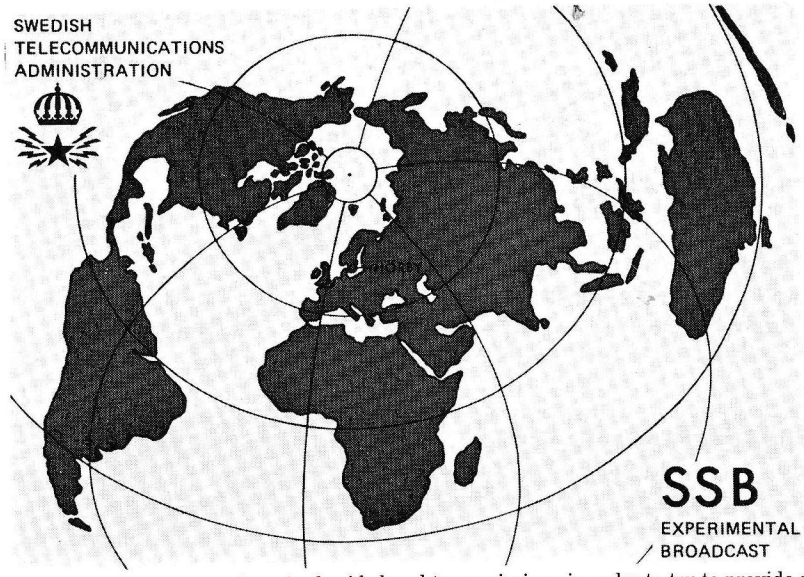
Jamming of the BBC and VOA ceased completely in Eastern Europe during the period 1960-68, but, with the Soviet invasion of Czechoslovakia, jamming again commenced. Since then, jamming has partially ceased as relations between East and West became more friendly. Shortwave listeners find jamming the worst interference on the dial. The high rolling sound interspersed with

Morse not only covers the station being jammed but spreads over to stations on either side which spoil the otherwise good reception of their broadcasts.

In recent months a new sound has been heard on the shortwave bands which is often described as being like a machine-gun or a woodpecker. This interference is believed to be a Russian over-the-horizon radar system, which covers much of the shortwave band spectrum and often obliterates signals over a wide frequency range. The interference has resulted in world-wide protest from broadcasters, radio amateurs and shortwave listeners, as the disruption to services is severe. The new listener to shortwave will soon recognize this sound and understand that nothing can be done to reduce its effectiveness.

Other Interference: Shortwave listeners will notice other types of interference and these include adjacent-channel splattering caused by a more powerful station operating on the next frequency, and this signal could spread over or splatter to the signal being tuned to. The only way to reduce this interference is to cut down the band width of

The first satellite transmission was broadcast by Sputnik I and this photo shows a verification of our reception.



Broadcasters are now using single side-band transmissions in order to try to provide a better service to some areas of the world and Radio Sweden's Home Programme is available on single side-band.

your receiver; this can be effected in receivers of the communications type (see Chapter 2, Part II). Another type of interference is radio teletype interference which also cuts to pieces the station you may be tuned to, and little can be done to get rid of this unwanted signal. When two stations are using the same frequency and are being received at about the same signal strength you get co-channel interference, with rapid fading in and out as one signal takes over the other for dominance on the frequency. Those using communications receivers should be able to overcome this by reducing the signal level and changing the direction of their aerial. Another annoying interference is the heterodyne interference caused by another signal which is not on the correct operating frequency and this station by being a little off its allocated channel causes a heterodyne whine or whistle to the other broadcasters. Morse Code, or CW, frequently heard on international broadcasting stations is often caused by an image, but this too may be eliminated by fine tuning of the signal. One must be very careful, or else the wanted signal may also be tuned out. There are also types of image interference from radio teletype

and facsimile transmissions, but the more expensive the receiver is and the more sophisticated it is with more circuitry and the more directional the antenna system being used, the less likelihood is one to be bothered by image interference. There are also types of interference caused by the aurora, and this results in fading out of signals or it could be the flutter fading as a signal is disturbed when it passes through the auroral zone. Some relief from this flutter fading may be gained by altering the aerial system or by using two aerials simultaneously. Then finally there is selective fading which causes distortion of the signal, and the most effective way of reducing this type of fading is to use more than one aerial, and, by a process of selection, choose the aerial which gives the best results under these severe fading conditions.

Wavelengths and Frequencies: The term "wavelength", which is given in metres, is the oldest form of reference when describing shortwave stations, but these days it is used mainly to refer only to the various metre bands. Some stations in Europe will quote the wavelength of their transmission in announcements but without exception the frequency is also given. The frequency is the more exact term and these are either given in kiloHertz or megaHertz, (1,000 kiloHertz equals 1 megaHertz).

How, then, is frequency converted into wavelength, and vice versa? For that the following two formulae are used: Frequency in kiloHertz (kHz) = 300,000 divided by the wavelength in metres, or: Wavelength in metres = 300,000 divided by the frequency in kiloHertz (kHz).

Metres	kiloHertz	megaHertz
49	6122	6.122
41	7205	7.205
31	9677	9.677
25	12000	12.000
19	15250	15.250
16	17750	17.750
13	21525	21.525

GOOD REPORTING LEADS TO IMPROVED RECEPTION

Shortwave listeners can assist in improving reception by keeping stations informed on frequency changes and interference which affects their transmission.

Four times a year the international shortwave stations make their major frequency changes; on the first Sunday in March, May,

September and November—because of seasonal changes, and also to try to decrease interferences.

Shortwave stations are supposed to operate within the internationally allocated shortwave bands. While stations which are members of the ITU (International Telecommunication Union) submit their provisional broadcasting schedules to a central office of the ITU in Geneva, Switzerland, others do not. In Geneva ITU and IFRB (International Frequency Registration Board) sort out the schedules well before they are due to come into operation. The material submitted to Geneva by broadcasters covers the four periods of transmission each year, two of which are for two months, the other two for four months. The two-month periods are at the time when the sun crosses the equator and unstable conditions prevail; the four-month periods cover summer and winter, when the seasonal conditions are relatively constant.

If there were ample room for shortwave stations in the bands and mutual interference was rare, no additional changes would be necessary during these periods because each station is allowed to work two frequencies in different bands for each programme, in order to cope with ionospheric irregularities. However, if interference from another station is suffered, measures have to be taken.

Firstly, the effect of the interference has to be estimated or measured; secondly the search for a new channel with better reception possibilities in the target area has to be conducted. This is often a difficult matter, as in most cases the transmitting station is unable to judge the band condition in another part of the world. Here is where the help of well-equipped listeners and monitors comes in. Then a decision has to be made, whether to move to another part of the band, or to stay put? During the periods between seasonal changeovers, stations prefer not to move about too much because moves to unlisted frequencies can be confusing to listeners. Moreover some stations may have a long standing use of certain frequencies originating from the early days of shortwave broadcasting, when there was ample room on the bands and co-ordination and planning were not necessary. It may be possible to persuade interfering stations to move, but in practice it is the weaker station which usually does so. Then the IFRB has to be notified of the change so it can be included in the frequency schedule.

It can be therefore seen that the shortwave listener can play a vital part in improving reception for the better enjoyment of listening as a whole. In my own case I am continually providing recordings,

telegraphing details and reports on interference problems to many of the world's leading stations, so that readers can better enjoy their shortwave listening.

In my monitoring work I have supplied information to the BBC since 1942 by telegraphed and airmail reports; to the CBC since 1945, and to the Voice of America, all on a weekly basis. On a monthly basis Austria, Holland, South Africa, Sweden, Vatican and other stations receive reports of monitoring over a monthly period.

International Symbols: In the early days of radio broadcasting, stations used a prefix allocated to them to denote the country of origin, and so VK stood for Australia, ZL for New Zealand and so on, but nowadays it is mainly the radio amateurs who continue to use this system which is still recognized internationally.

Over the past few years a series of alphabetical prefix symbols identifies countries on international frequency schedules as devised by the International Telecommunications Union in Geneva. This series is the one which is most used today and the following list shows the symbols and the country assigned to each symbol.

AFG	Afghanistan	CBG	Cambodia (Kampuchea)
AFS	South Africa	CHL	Chile
AGL	Angola	CHN	People's Republic of China
ALB	Albania	CHR	Republic of China (Taiwan)
ALG	Algeria	CKH	Cook Islands
AND	Andorra	CLM	Colombia
ARG	Argentina	CLN	Sri Lanka
ARS	Saudi Arabia	CME	Cameroon
ASC	Ascension Islands	CNR	Canary Islands
ATN	Netherlands Antilles	COG	Congo
AUS	Australia	COM	Comoro Islands
AUT	Austria	CPV	Cape Verde Islands
B	Brazil	CTI	Ivory Coast
BBC	British Broadcasting Corp.	CTR	Costa Rica
BDI	Burundi	CUB	Cuba
BEL	Belgium	CVA	Vatican State
BEN	Benin	CYP	Cyprus
BGD	Bangladesh	D	Federal Republic of Germany
BHR	Bahrain	DAH	Benin
BHU	Bhutan	DDR	German Democratic Republic
BLR	Bylorussia	DNK	Denmark
BOL	Bolivia	DOM	Dominican Republic
BOT	Botswana	DW	Voice of Germany
BRM	Burma	E	Spain
BRU	Brunei	EGY	Egypt
BUL	Bulgaria	EQA	Ecuador
CAF	Central African Republic	EQG	Equatorial Guinea
CAN	Canada	ETH	Ethiopia

F	France
FJI	Fiji
FNL	Finland
G	Great Britain and N. Ireland
GAB	Gabon
GHA	Ghana
GIL	Gilbert and Ellice Islands
GMB	Gambia
GRC	Greece
GRL	Greenland
GTM	Guatemala
GUB	Guyana
GUF	French Guiana
GUM	Guam
GUI	Guinea
HNB	Belize
HND	Honduras
HNG	Hungary
HOL	Holland, Radio Netherlands
HTI	Haiti
HVO	Upper Volta
HWA	Hawaii
I	Italy
IND	India
INS	Indonesia
IOB	British West Indies
IRN	Iran
IRQ	Iraq
ISL	Iceland
ISR	Israel
J	Japan
JOR	Jordan
KEN	Kenya
KOR	Korea (Republic of)
KRE	Korea (People's Dem.Rep.)
KWT	Kuwait
LAO	Laos
LBN	Lebanon
LBR	Liberia
LBY	Libya
LUX	Luxembourg
MAU	Mauritius
MCO	Monaco
MDG	Malagasy
MEX	Mexico
MLA	Malaysia
MLD	Maldive Islands
MLI	Mali
MLT	Malta
MNG	Mongolia
MOZ	Mozambique
MRC	Morocco
MRT	Martinique
MTN	Mauritania
MWI	Malawi
NCG	Nicaragua
NCL	New Caledonia
NGR	Niger
NHB	New Hebrides
NIG	Nigeria
NOR	Norway
NPL	Nepal
NZL	New Zealand
OAS	Org. of Am. States
OCE	Tahiti
OMA	Oman
PAK	Pakistan
PHL	Philippines
PNG	Papua New Guinea
PNR	Panama
POL	Poland
POR	Portugal
PRG	Paraguay
PRU	Peru
QAT	Qatar
REU	Reunion
RFE	Radio Free Europe
RHS	Rhodesia (Zimbabwe)
RL	Radio Liberty
ROU	Romania
RRW	Rwanda
RYU	Ryukyu Islands
S	Sweden
SDN	Sudan
SEN	Senegal
SEY	Seychelles
SHN	Saint Helena
SLM	Solomon Islands
SLV	El Salvador
SNG	Singapore
SOM	Somalia
SRL	Sierra Leone
SUI	Switzerland
SUR	Surinam
SYR	Syria
SWR	Swaziland
TCD	Chad
TCH	Czechoslovakia
TGK	Tanzania
TGO	Togo
THA	Thailand
TUN	Tunisia
TUR	Turkey
TWR	Transworld Radio
UAE	United Arab Emirates
UGA	Uganda
UKR	Ukraine
UN	United Nations
URG	Uruguay
URS	Union of Soviet Socialist Republic
USA	United States of America

VEN	Venezuela
VOA	Voice of America
VTN	Vietnam
YEM	Yemen
YMS	Southern Yemen
YUG	Yugoslavia
ZAI	Zaire
ZAN	Zanzibar
ZMB	Zambia

CHAPTER NINE

Mediumwave

Listening on mediumwave, or on what has become to be known as the broadcast band, is universal, for everyone tunes to this band to hear their local radio station and it is in this frequency range between 531 and 1602kHz that the Radio New Zealand, Australian Broadcasting Commission and the private commercial radio stations operate. This frequency range or band has been in use in Australasia for more than fifty years and is common throughout the Commonwealth. DX listening is generally confined to after dark. It may be hard to believe that on the same band as you hear your local stations it is also possible to hear every continent during the hours of darkness, subject to seasonal variations.

On the mediumwave band, reception over long distances is possible only when the transmission path is in darkness. Reception is still possible when either the transmitting or receiving end of the transmission path is in the half light of dawn or dusk. Signals from across the Tasman are the easiest to receive by DXers in New Zealand, being at good level from dusk to station close-down, or throughout the night in the case of all-night transmissions.

Propagation: Ground waves of these frequencies travel along the surface of the earth and grow weaker as the distance from the transmitter becomes greater. This is mainly caused by the conductivity of the soil. Under normal conditions a relatively strong transmitter can be heard up to about 500km away, but if the waves travel over water the range increases considerably and can become as much as 18,000km for the same relative signal strength. The absorption which causes the limitations has a more severe effect on the higher frequencies in this band (towards 1602kHz) than of the lower frequencies, (towards 531kHz).

Skywaves offer better opportunities. They are reflected by an ionospheric layer in the sky and are thus forced to return to the earth.

Modern broadcasting finds the announcer is also in most cases the technician, providing not only the linking of programmes but also playing the music and the commercials which are recorded on a cartridge system. Radio i in Auckland is New Zealand's most modern private commercial station and here one of the announcers is photographed in action.

As I mentioned in Chapter 7, there are several of these ionospheric layers: the D-layer situated at a height of about 50km; the E-layer at about 80km; the sporadic E-layer—which becomes available under special conditions — at a slightly higher level, and the F-layer which is at least 240km high.

These layers are formed by solar radiation, chiefly in the ultraviolet and X-ray regions. Due to the extreme low density of the upper atmosphere this radiation is able to ionize atoms, (splitting off free electrons). The concentration of free electrons in the D-layer is lower than that of the E-layer and this in turn is lower than the electron density of the F-layer.

It will be interesting for you to note that propagation characteristics within the mediumwave band are different for higher and lower frequencies. The higher the frequency, the less it suffers from absorption and the further it penetrates into the layer before it is finally bent downwards. The lower the frequency, the worse the effect of absorption and the lower the altitude of reflection will be. This will

also have its influence on the range of sky-wave propagation via the E-layer for mediumwave frequencies: the higher the frequency the greater the range. After sunset, the concentration of electrons in the E-layer will gradually decrease due to recombination of atoms and the absence of sunlight (which is necessary for new free electron production), and F-layer propagation becomes possible for the higher mediumwave frequencies, particularly those between 1000 and 1600kHz.

This F-layer propagation permits a reflection to cover a much greater distance (due to the height of the layer), and real DX becomes possible over distances far beyond the normal range.

Reception Patterns: From the above explanation it will be seen that, with 24 hours in the day, half of the world is in darkness while the other half is in daylight. It is in the twelve-hour period which, with you at your receiver and the other areas of the world also being in the darkness section, is the field of your mediumwave listening. In the daylight, your reception is very much restricted to stations in your area, but after dark, the whole medumwave band is alive with signals; most of these are from Australian and New Zealand stations, but when you take on mediumwave listening and move into the fields of really distant reception, then a pattern of the transmission path becomes known.

One of the main concerns of the new listener is to try to identify these weaker signals and, even though they may be broadcasting in English, only small portions of the announcement may be heard. For instance, if you are listening in Wellington at dusk around 8.00 p.m., you may hear a station announcing that the time is 1 o'clock. This means that the broadcast is coming from a station in the Mountain Standard Time Zone of North America, as it is 1.00 a.m. in that zone. It could not possibly be 1.00 p.m. in some other part of the world, as 1.00 p.m. would be in the time zone 5 hours ahead of GMT, which would place the area in Pakistan and, as it is broad daylight there, the signal could not possibly come from the west, but instead must be received at your location from countries to your east.

The pattern of reception, therefore, is that around dusk in a very good location and using a long-wire or a loop aerial, the signals from North and South America are received. During the equinox, (March and September), signals can also be heard from Europe which are being received on a path across North America. Later in the evening, signals from Japan and other stations in Asia can be heard after the

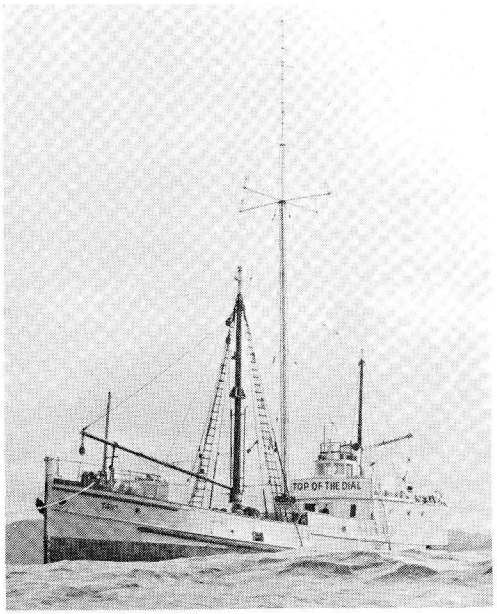
ABC stations close down; and as we move towards dawn, those in the Middle East, Europe and Africa are received. During the summer months there is a period of reception time during which North American stations can be heard with their morning programmes as stations there open at 6.00 a.m. local time, their local sunrise. This path from North America is opened from 11.00 p.m. to 3.00 a.m. in Wellington and at each hour it becomes 6.00 a.m. in the various time zones in North America. At 11.00 p.m. in Wellington it is 6.00 a.m. in New York; at midnight it is 6.00 a.m. in Chicago; at 1.00 a.m. it is 6.00 a.m. in Denver, and at 2.00 a.m. it is 6.00 a.m. in San Francisco.

Mediumwave Reception Reports; A sample reception report to a mediumwave station is included in this chapter. The listener must remember that a local station is primarily interested in its local community and if it is a commercial station, this is where its advertising revenue comes from and a reception report from a listener some thousands of kilometres away is just a bonus. So your report must be interesting, attractive and must mean to the station that their signal, though not intended, can be heard away across the other side of the world. Therfore it is essential in your report to include as much local information as possible. The names of the advertiser, times, names of recordings in programmes and weather conditions are a great help to enable the station to check with their broadcasting log that the actual programme they had broadcast was the same as that which you have submitted for verification purposes.

Mediumwave stations, of course, are often linked in networks. This is the case in Australia with ABC, and in New Zealand with RNZ. Here it is sometimes difficult to get local identification, but many stations break off and carry local news for an area. If you can log the station on a local news bulletin this is of greatest advantage because it does identify the station you are listening to. If we were to listen on a frequency on which several ABC low-powered repeater stations operate in some parts of Australia, it would be difficult to positively identify the source of the signal being heard, as up to 5 stations could be carrying the same programme from the ABC. It is only when local news is taken that the station could be identified, as the news could be from studios in Queensland, New South Wales, Victoria, Tasmania or South Australia. The fact that South Australia is on a time zone 30 minutes behind Eastern Australia allows stations in that state carrying ABC programmes to be heard after the Eastern stations close. When submitting your reception report

always include return postage in the form of an International Reply Coupon, or mint stamps of the country to which you are writing.

Frequency Coverage: At the present time the frequency range of 531 to 1602kHz is in use in Europe, Africa and Asia, as well as the Pacific, with 9kHz separation. Only North and South America remain on an old 10kHz spacing and so their signals will be heard between Australasian stations, and it is only when the two systems are on a common frequency that this does not occur. For instance, 630, 720 and 810kHz will be common throughout the world. The new plan shows that both Australia and New Zealand have submitted locations for proposed new stations which are not yet on the air, (and indeed in some locations may never eventuate), because it is necessary for the frequencies to be allocated now to some areas which are at present sparsely populated. In the case of New Zealand, of the 120 stations listed only 62 are in operation at the present time.



Broadcasting has originated from unusual places, but in New Zealand the Tiri, the Pirate radio station broadcast off Auckland for 1111 days. There were pirate radio stations also off England and Holland, but Radio Hauraki gained world fame because it broke the broadcasting monopoly in New Zealand, and this allowed the introduction of private commercial radio stations.

N.Z. RADIO DX LEAGUE

New Zealand Radio DX League

OFFICIAL PUBLICATION: THE N.Z. DX TIMES

MEMBER'S CORRESPONDENCE

PLEASE REPLY TO:
Mr John Smith,
67 Glenalmond Crescent,
Invercargill, N.Z.

STATION: Radio 2AB,
Newcastle,
NEW SOUTH WALES.

DATE: 31 March 1980

Dear Sirs,

I am pleased to report reception of your station operating on 1020 kiloHertz in Newcastle from 1000 to 1030 hours GMT/ AEST 8-8.30pm time, on 30 March 1980 date GMT/ ..... time.

Reception Conditions:
Signal Strength: See SINPO section Readability of Signal: See SINPO section
Interference: See SINPO section for details (Chapter 10)

Overall Rating: Brief details of signal, quality of speech etc.
Receiver: Make and number of valves or transistors
Antenna: Height, length and type
Receiving Location: Sydney

Time ~~GMT~~/Local	Programme Heard Details and Comments	Technical Comments
AEST	Sunday, 30 March 1980	
8.00pm	Male announcer gives identification announcement "This is 2AB, Newcastle, your friendly station broadcasting on 1020 on your dial." Percy Faith and his orchestra present "Lemon Tree".	
8.04pm	Advertisement for Pall Mall cigarettes. The Beatles sing "Yellow Submarine".	
8.07pm	Advertisement for a firm of Newcastle Real Estate agents Phone 44044 given. (Unable to pick up name of firm due to interference). Male vocalist sings "I want to be happy".	
8.10pm	Announcer gives programme announcements, then local news item follows.	
8.15pm	Time announcement: "The time is quarter past eight at 2AB your friendly station, 1020 on your dial". Radio Theatre of the Air follows with a play by Tolstoy "The Promise" presented by the Newcastle Drama Players. This play continued past 8.30pm.	
	(Add any comments you may think helpful - such as quality etc. A friendly word is also desirable).	

I hope that this report will be of value to your Technical and Programming Staff, and if it corresponds with your station log, I would be pleased to receive your verification (QSL).

With very best wishes,

JOHN SMITH

Allocations have been made for 120 stations, but only half of these are operating and the balance is projected. New Zealand stations are allocated numerals also, indicating the provincial district: 1 Auckland, 2 Wellington, 3 Canterbury, 4 Otago-Southland.

FREQUENCY (kHz)	LOCATION	CALL SIGN	POWER (kW)
531	Alexandra	*	—
540	Waimiha	*	—
558	Invercargill	4ZG	5
567	Wellington	2YA	100
576	Oban	*	—
585	Mahia	*	—
594	Timaru	*	—
603+	Auckland	*	—
603+	Paengaroa	*	—
621	Haast	*	—
630	Opapa	2YZ	20
639	Alexandra	4YW	2
648	Kerikeri	*	—
657	Wellington	2YC	60
666	Thames	*	—
675	Christchurch	3YA	20
684	Fairlie	*	—
693	Russell	*	—
702+	Paengaroa	*	—
702+	Takapau	*	—
711	Taupo	*	—
720	Invercargill	4YZ	20
747	Kumara	3ZA	2
756	Auckland	1YA	20
765	Hastings	2ZK	2
774	Kaikoura	*	—
783	Wellington	2YB	20
792	Chatham Is	*	—
792	Ross	*	—
801	Hastings	*	—
810	Dunedin	4YA	20
819	Paengaroa	1YZ	10
828	Takapau	*	—
837+	Kaitaia	1YK	2
837+	Whangarei	1YX	2
846	Masterton	2ZD	2
855	Hamilton	*	—
864	Invercargill	4ZA	10
873	Ashburton	3ZE	1
882	Auckland	1YC	10
891	Wellington	2XW	5
900	Dunedin	4YC	10
918	Chatham Is	*	—
918	Kumara	3YZ	10
927	Palm. North	2ZA	2
936	S. Arnaud	*	—

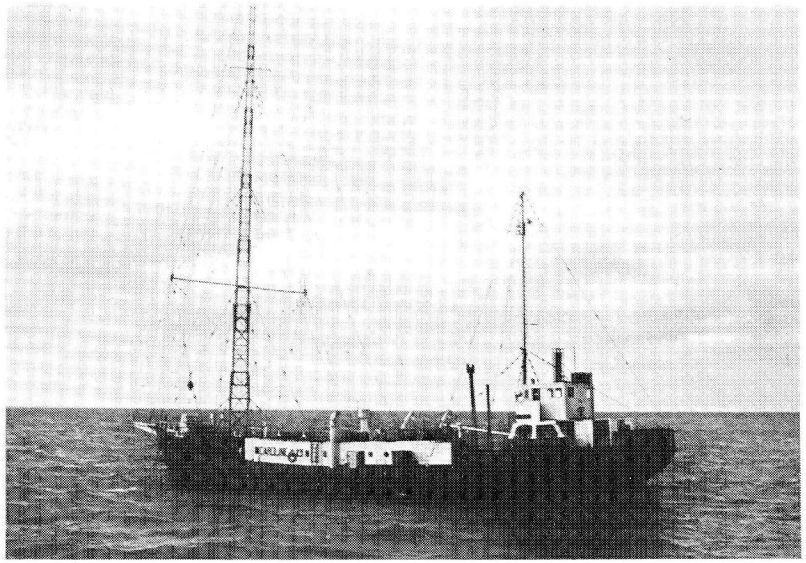
945	Gisborne	2ZG	2
954	Hamilton	1XW	2
963+	Christchurch	3YC	10
963+	Mahia	*	—
981	Kaikohe	1YE	2
990	Dunedin	*	—
999+	Haast	*	—
999+	Reefton	*	—
1008	Paengaroa	1ZD	10
1026+	Kaitaia	1ZK	2
1026+	Whangarei	1ZN	2
1035	Wellington	2ZB	20
1044	Dunedin	4ZB	10
1053	New Plymouth	2ZP	2
1062	Rotorua	*	—
1071	Kumara	*	—
1080	Auckland	1ZB	10
1098	Christchurch	3ZB	10
1116	Nelson	2YX	2
1125	Waipawa	*	—
1134	Queenstown	4YQ	2
1143	Hamilton	1YW	2
1152	Timaru	3ZC	2
1161	Wellington	2ZM	2
1170	Te Kuiti	*	—
1197	Wanganui	2ZW	2
1206	Dunedin	4XO	2
1215+	Dargaville	*	—
1215+	Kaikohe	1ZE	2
1224	Oban	*	—
1233	Ohakune	*	—
1242+	Murapara	1XX	0.1
1242+	Whakatane	1XX	2
1251	Auckland	1ZM	2
1260	Christchurch	3XA	2
1269	Takaka	*	—
1278	Napier	2ZC	2
1287	Westport	*	—
1296	Hamilton	1ZH	2
1305	Dunedin	*	—
1314+	Gisborne	2YW	2
1314+	Taupo	*	—
1323	Christchurch	3ZM	2
1332	Auckland	1XI	5
1341	Nelson	2ZN	2
1350	Rotorua	1ZC	2
1359	Queenstown	*	—
1368	Whakatane	*	—
1377	Kumara	*	—
1386	Turangi	1ZT	0.1
1395	Balclutha	*	—
1404	Warkworth	*	—
1413	Tokoroa	1ZO	2
1422	Opunake	*	—
1431	Dunedin	4XD	0.25
1440	Hamilton	*	—

1449	Palm. North	2YM	2
1458	Westport	3YW	2
1467	Wellington	*	—
1476	Auckland	1XA	5
1485	Twizel	3ZO	0.1
1494	Taupo	1ZA	2
1503	Castlepoint	*	—
1512	Taumarunui	1ZU	1
1521	Reefton	3YR	0.1
1530	New Plymouth	*	—
1539	Blenheim	2ZE	1
1548	Invercargill	*	—
1557	Hawera	2ZH	2
1566	Rotorua	*	—
1575	Christchurch	3XG	2
1584	Dannevirke	*	—
1593	Auckland	1XP	5
1602	Hari Hari	*	—

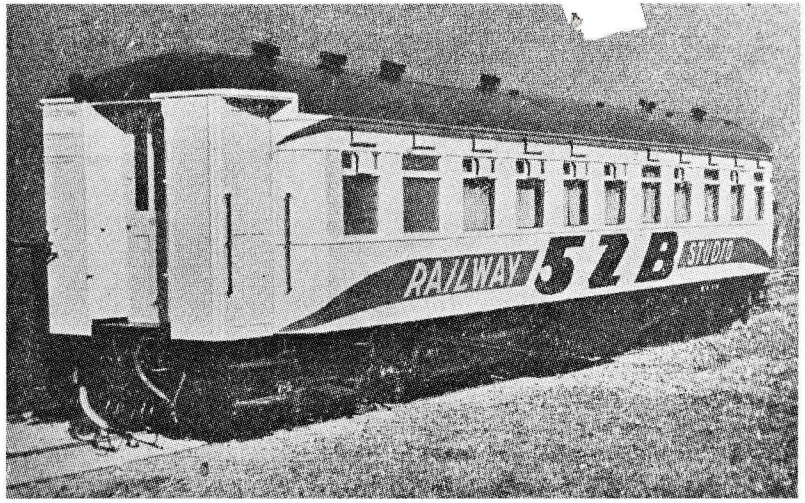
* Not allocated

\+ Synchronous

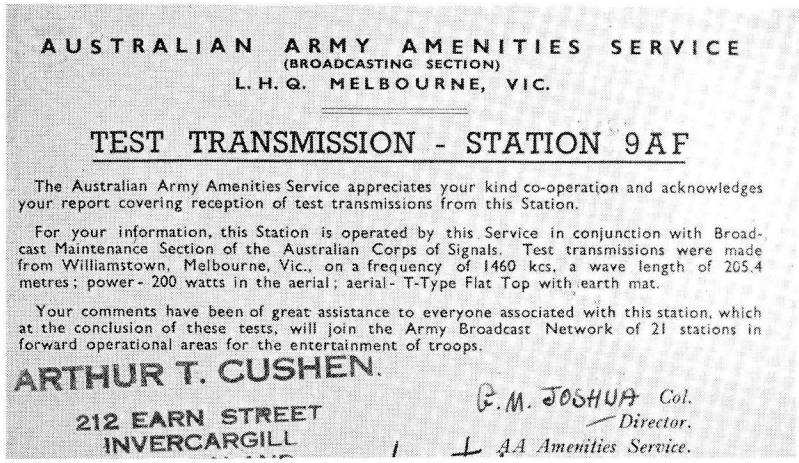
This list of stations and frequencies should be taken only as tentative. Although New Zealand and Australia have registered



The Caroline, the best known of English pirate radio stations, which broadcast off-shore in the English Channel.



A radio station on wheels operated in Victoria in the 1930's while in New Zealand in 1940, a broadcasting station housed in a railway carriage toured the North Island spending up to two weeks in many small towns.



AUSTRALIAN ARMY AMENITIES SERVICE
(BROADCASTING SECTION)
L. H. Q. MELBOURNE, VIC.

TEST TRANSMISSION - STATION 9AF

The Australian Army Amenities Service appreciates your kind co-operation and acknowledges your report covering reception of test transmissions from this Station.

For your information, this Station is operated by this Service in conjunction with Broadcast Maintenance Section of the Australian Corps of Signals. Test transmissions were made from Williamstown, Melbourne, Vic., on a frequency of 1460 kcs, a wave length of 205.4 metres; power - 200 watts in the aerial; aerial - T-Type Flat Top with earth mat.

Your comments have been of great assistance to everyone associated with this station, which at the conclusion of these tests, will join the Army Broadcast Network of 21 stations in forward operational areas for the entertainment of troops.

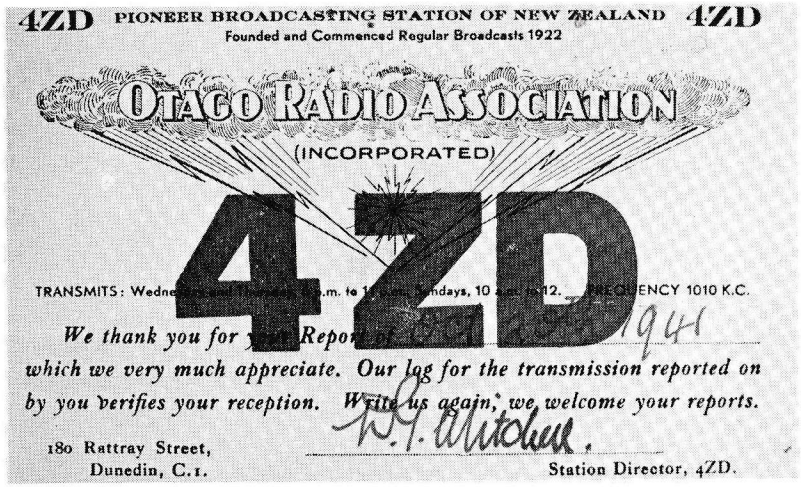
ARTHUR T. CUSHEN.
212 EARN STREET
INVERCARGILL

E. M. JOSHUA Col.
Director.
AA Amenities Service.

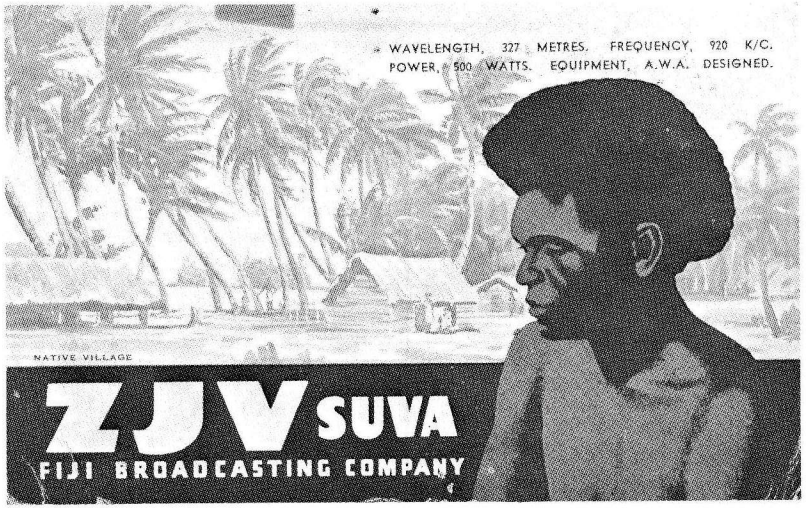
During the war, the Australian Forces were served with small radio stations in New Guinea and later in Japan. This photo shows a typical verification of one station which was tested in Melbourne before being shipped to the front lines.

these frequencies there is no guarantee that a station in the location shown may ever be built. The frequencies have been assigned for each country and this means that any of the channels can be held for future use. The location of the proposed station can be altered if necessary. The previous agreement showed a similar pattern; some areas were listed for radio stations which even today have none, but the frequencies were used for stations in other parts of the country. In the following list of Australian mediumwave stations, the numeral in the call sign indicates the State: 2 New South Wales, 3 Victoria, 4 Queensland, 5 South Australia, 6 Western Australia, 7 Tasmania, 8 Northern Territory.

Call Sign and Location of Station		KW	KHz	Call sign and Location of Station		KW	KHz
5UV	Adelaide	.5	531	2KP	Kempsey	10	684
2KM	Kempsey	5	531	6BS	Busselton	4	684
3UL	Warragul	5	531	8TC	Tennant Creek	1	684
4KZ	Innisfail-Tully	5	531	4KQ	Brisbane	5	693
6DL	Dalwallinu	10	531	5SY	Streaky Bay	2	693
4QL	Longreach	10	540	2BL	Sydney	50	702
7SD	Scottsdale	5	540	4QW	St George	10	711
2CR	Orange	50	549	7NT	Launceston	10	711
4GY	Gympie	2.5	558	2AN	Armidale	.05	720
4AM	Atherton	5	558	2ML	Murwillumbah	.2	720
6WA	Wagin	50	558	3MT	Omeo	2	720
7BU	Burnie	5	558	4AT	Atherton	4	720
2BH	Broken Hill	.5	567	6WF	Perth	50	720
4JK	Julia Creek	10	567	5CL	Adelaide	50	729
6MN	Mount Newman	.1	567	2NR	Grafton	50	738
2FC	Sydney	50	576	4QS	Toowoomba	10	747
2WEB	Bourke	2	576	2TR	Taree	2	756
3WV	Horsham	50	594	4QA	Mackay	2	756
6PH	Port Hedland	2	603	6KW	Kununurra	.1	756
7ZL	Hobart	10	603	2BE	Bega	5	765
6NM	Northam	.2	612	2BE	Moruya (Translator)	.5	765
4QR	Brisbane	50	612				
3AR	Melborne	50	621	3LO	Melbourne	50	774
4QN	Townsville	50	630	4TO	Townsville	2	774
7QN	Queenstown	.4	630	2KA	Katoomba	2	783
6AL	Albany	.4	630	6VA	Albany	2	783
5CK	Port Pirie	10	639	4QG	Brisbane	10	792
4MS	Mossman	1	639	2EA	Sydney	5	801
2NU	Tamworth	10	648	4QY	Cairns	2	801
6GF	Kalgoorlie	2	648	5RM	Renmark	2	801
2BY	Byrock	10	657	2BA	Bega	10	810
8DR	Darwin	2	657	6WN	Perth	10	810
2CO	Albury	10	675	2GL	Glen Innes	10	819
6BE	Broome	.05	675	3GI	Sale	10	828
8KN	Katherine	.05	675	4NA	Nambour	5	828



New Zealand has claim to the oldest radio station in the British Commonwealth, and station 4XD operated by the Otago Radio Association was established in 1922.



Radio in Fiji and Australia was pioneered by AWA in the shortwave field. ZJV was frequently heard from Suva in the 1930's. Today broadcasting is controlled by the Fiji Broadcasting Commission.

6GN	Geraldton	2	828	2UH	Muswellbrook	1	1044
4RK	Rockhampton	10	837	4WP	Weipa	.5	1044
3CR	Melbourne	1.25	837	5PI	Crystal Brook	2	1044
6ED	Esperance	1	837	2CA	Canberra	5	1053
7QT	Queenstown	.5	837	3CV	Maryborough	5	1071
2CY	Canberra	10	846	4SB	Kingaroy	2	1071
4CA	Cairns	5	846*	6WB	Katanning	2	1071
6CA	Carnarvon	.2	846	2MO	Gunnedah	2/1	1080
4QB	Maryborough	10	855	4MI	Mount Isa	.2	1080
4GR	Toowoomba	2	864	6IX	Perth	2	1080
6AM	Northam	2	864	7HT	Hobart	2	1080
7HO	Hobart	2	864	2GZ	Orange	2	1089
2GB	Sydney	5	873	3WM	Horsham	2	1089*
6DB	Derby	2	873	4LG	Longreach	2	1098
3YB	Warrnambool	2	882	6MD	Merredin	2	1098
4BH	Brisbane	5	882	7LA	Launceston	2	1098
6PR	Perth	2	882	2UW	Sydney	5	1107
5AN	Adelaide	50	891	3EA	Melbourne	5	1116
2LM	Lismore	2	900	4BC	Brisbane	5	1116
6BY	Bridgetown	2	900	2AD	Armidale	2	1134
7AD	Devonport	2	900	3CS	Colac	5	1134
8HA	Alice Springs	2	900	6CI	Collie	2	1134
2XL	Cooma	2/1	918	2HD	Newcastle	2	1143
4VL	Charleville	2/1	918	2WG	Wagga	2	1152
6NA	Narrogin	2	918	4MB	Maryborough	2	1161
3UZ	Melbourne	5	927	5PA	Naracoorte	10	1161
4CD	Biloela (Translator)	.1	927	7FG	Fingal	1	1161
				2CH	Sydney	5	1170
4CD	Gladstone	5	927	4GC	Charters Towers	.1	1170
6NR	Perth	.5	927	3KZ	Melbourne	5	1179
4AY	Ayr	5	936	2NX	Inverell	2	1188
7ZR	Hobart	10	936	6XM	Exmouth	2	1188
3BO	Bendigo	2	945	4GG	Gold Coast	5	1197
2UE	Sydney	5	954	5KA	Adelaide	2	1197
2RG	Griffith	2	963	2CC	Canberra	5	1206
4WK	Warwick	5	963	2GF	Grafton	2	1206
6TZ	Bunbury	2	963	6KY	Perth	2	1206
2MW	Murwillumbah	5	972	2WS	Sydney	5	1224
5DN	Adelaide	2	972	2NC	Newcastle	10	1233
3HA	Hamilton	2	981	3TR	Sale	5	1242
4RO	Rockhampton	2	981	4AK	Oakey	2	1242
6KG	Kalgoorlie	2	981	5AU	Port Augusta	2	1242
6PM	Perth	2	990	8DN	Darwin	2	1242
8GO	Gove	.5	990	2DU	Dubbo	2	1251
2NB	Broken Hill	2	999	3SR	Shepparton	2	1260
2ST	Nowra	1	999	6KA	Karratha	1	1260
2XX	Canberra	.3	1008	2SM	Sydney	5	1269
4IP	Ipswich	5	1008	3AW	Melbourne	5	1278
6GE	Geraldton	2	1008	2TM	Tamworth	2	1287
7EX	Launceston	2	1008	4BK	Brisbane	5	1296
2KY	Sydney	5	1017	5SE	Mount Gambier	2	1296
6WH	Wyndham	.1	1017	2WL	Wollongong	5	1314
3DB	Melbourne	5	1026	3BA	Ballarat	5	1314
4MK	Mackay	5	1026	2GO	Gosford	5	1323
6NW	Port Hedland	1	1026	5AD	Adelaide	2	1323

3SH	Swan Hill	2 1332	3AK	Melbourne	5 1503
4BU	Bundaberg	2 1332	2NA	Newcastle	10 1512
2NX	Bolwarra (Newcastle)	5 1341	2QN	Deniliquin	2 1521
			2VM	Moree	2 1530
3GL	Geelong	2 1350	2JJ	Sydney	10 1539
2LF	Young	2 1359	4QD	Emerald	50 1548
2GN	Goulburn	2 1368	2RE	Taree	2 1557
4LM	Mount Isa	2 1368	3NE	Wangaratta	2 1566
3MP	Melbourne	5 1377	4GM	Gympie	.2 1566
8AL	Alice Springs	2 1377	2OO	Wollongong	5 1575
5AA	Adelaide	5 1386	2WA	Wilcannia	.1 1584
2LT	Lithgow	5 1395	5MG	Mount Gambier	.2 1584
2PK	Parkes	2 1404	5WM	Woomera	.05 1584
2KO	Newcastle	2 1413	7SH	St Helens	.1 1584
3XY	Melbourne	5 1422	4SO	Southport	.2 1593
2WN	Wollongong	2 1431	5MV	Renmark	2 1593
2CN	Canberra	2 1440	2CP	Cooma	.05 1602
2MG	Mudgee	5 1449	2CT	Campbelltown	.25 1602
2NM	Muswellbrook	2/1 1458	3WL	Warrnambool	.2 1602
5MU	Murray Bridge	2/1 1458	5LC	Leigh Creek	.05 1602
3MA	Mildura	2 1467			
2KA	Penrith (Translator)	.25 1476	* Interim operating frequency		
4ZR	Roma	2/1 1476	**Station**		**Frequency**
2LG	Lithgow	.2 1485	4CA	Cairns	1008*
4HU	Hughenden	.05 1485			
5LN	Port Lincoln	.2 1485			
2AY	Albury	2 1494			
2BS	Bathurst	5 1503			

NOTE: The numbers in the Australian call signs indicate the State in which they are located. 2 =New South Wales, 3 Victoria, 4 Queensland, 5 South Australia, 6 West Australia, 7 Tasmania, and 8 Northern Territory.
When Australia changed to 9kHz separation on November 23 1978 the following channels were left unoccupied 5,666, 909, 1035, 1062, 1125 and 1305kHz.

THE LOOP AERIAL (OR FRAME AERIAL) FOR MEDIUMWAVE RECEPTION (described by Tom Duerden, ZL4IJ).

Aerials suitable for mediumwave reception need to be longer than those intended for shortwave. The types which are described in Chapter 4 can be lengthened, but space in your backyard then becomes a problem. A simple yet very effective way of making a long wire act as an aerial in a small space is to wind it on a frame and connect a variable capacitor between the ends of the wire. This variable capacitor is also known as a variable "condenser" or a variable "capacitance" and it should have a capacity of about 350 picofarads. Such a variable capacitor is commonly used in crystal sets and one-transistor kits.

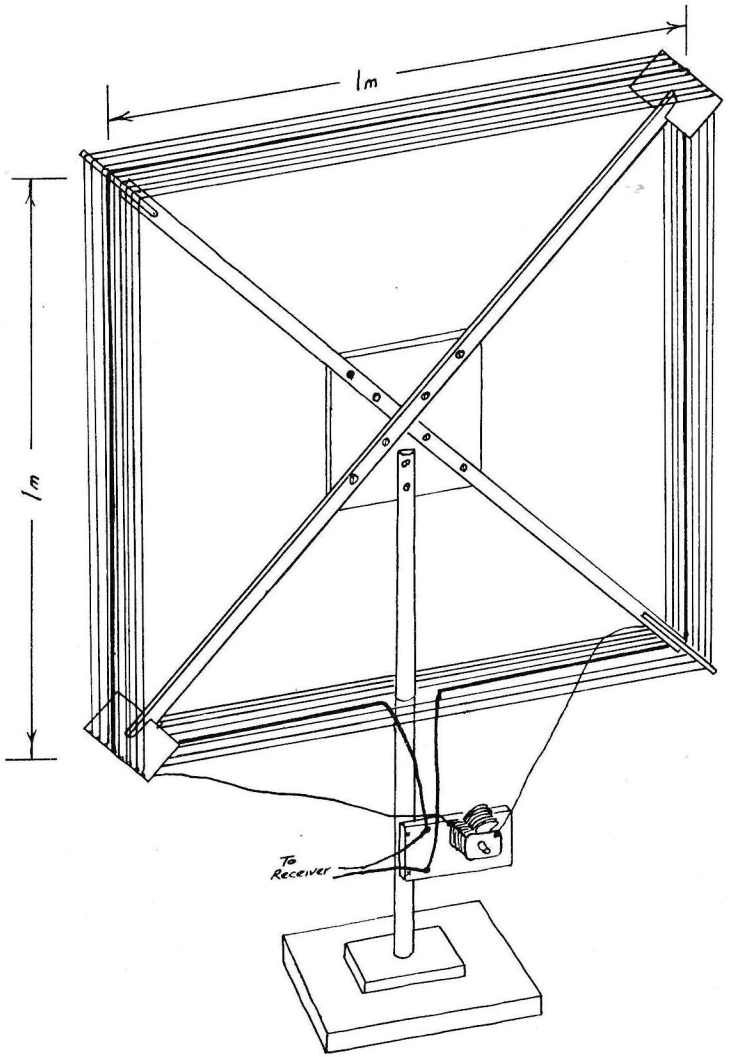
The wire can be single-strand bell-wire, or insulated fine coper wire down to 26 gauge. Remember to scrape the insulation, which may be plastic or enamel, off the ends of the wire before you connect them to the capacitor. Your radio store can supply you with up to 40 metres of suitable wire and the variable capacitor, and will also show you where to connect the ends of the wire to the two points on the capacitor. You should solder each of these two connections when you make them.

The frame itself can be of any shape or size; but the larger it is, the more effective it will be as an aerial. It is usually made with four sides and with up to one metre length for each side. Nine complete turns of wire in a square frame of one metre side, to fifteen complete turns in a frame of 380mm side are recommended: the smaller the enclosed area, the more the turns needed.

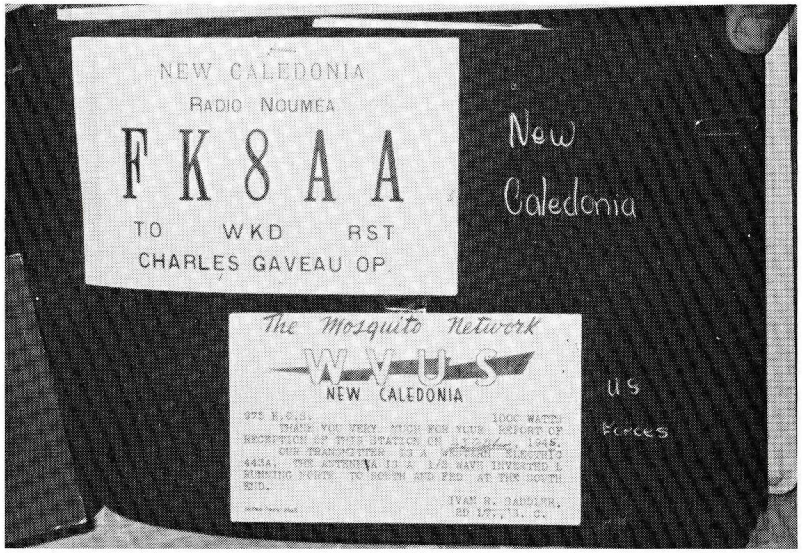
To Use the Loop Aerial: Place your transistor portable radio inside the loop so that the longest side of your portable is at right angles to the bottom side of the loop. Tune the dial of your portable to a station coming in weakly; next tune the variable capacitor of the loop aerial until the station comes in more strongly and then turn both the loop and the portable radio inside it sideways, (as if they were on a turntable), until the station comes in more strongly still. Do this procedure for each station. You will be amazed at how well the loop aerial can make a weak distant station seem more like a local station. The directional characteristics of the loop aerial can also help you to separate distant stations which are close in frequency but in different directions from you. The loop has little effect on local stations however, because your portable receives them well enough without the loop.

If your radio receiver has terminals, (or a socket), for an aerial and an earth, it can be connected with the loop aerial in the following way: take a separate length of insulated wire and wind a single turn of it around the frame of the loop on top of, or beside, the main loop of wire. (This single turn is not connected to the main loop). Leave enough of the length of wire from each end of this single turn so that you can lead away these ends from near the bottom of the frame in order to connect one end to the aerial terminal and the other end to the earth terminal of your set. These lead ends can be two or three metres long if you wish to place the whole aerial at a short distance

from your radio receiver. You will find in practice that there is a limit to this distance unless you use specialized connecting cables.



This photograph shows a selection of cards from mediumwave stations in North America heard by the writer and ranging in power from 250 to 50,000 watts.



Mediumwave broadcasting in New Caledonia our nearest neighbour has had an interesting history; firstly it was operated by a radio amateur; then during the War the Mosquito Network of the American Forces broadcast from Noumea, and now the station is under French Administration.

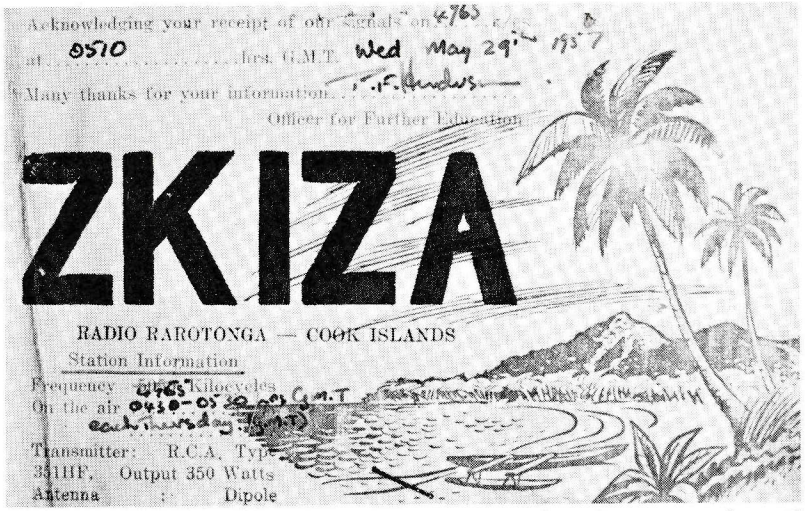
CHAPTER TEN

Shortwave listening as a hobby

When I cast my mind back 40 years I think of such calls as FK8AA, FO8AA, W3XAL, W8XK and many more, and I marvel that shortwave radio has developed from the experimental stations to the modern international broadcasters which play such a part in world understanding. The call-signs quoted are only a few of the many stations which used to broadcast programmes on shortwave, but were licensed as experimental stations by various governments which did not then foresee the force that international shortwave radio was to play in our world. In 1939, World War II shook the shortwave bands and Governments from their complacency; propaganda, news and the other side's opinion became paramount, and getting a message to the listening enemy gave shortwave the boost that has set the pattern of our life today. Radio with speed, efficiency and clarity has become one of the mainstays of communication, entertainment and education. Listeners today are awakening to the fascination which shortwave radio has had for me for 40 years.

It is my aim to help to make the new, younger shortwave fan more aware of how radio broadcasting developed and I hope to give some shortcuts to better reception and operating techniques. I, along with many others of my age group, had to learn the hard way—without callbooks, without accurate dial calibration, with no established co-operation between DX-ers and DX clubs, and no DX sessions. We had to learn the dial and the stations which operated on it by our own listening. DX listeners had to overcome the problems of poor communication by sea mail, of educating the stations that confirmation of reception was wanted and of trying to build together the DX-ers from groups into clubs and, now, national bodies to foster this popular hobby.

It first became apparent that some means of communication of what one was hearing was necessary, firstly through a radio


Acknowledging your receipt of our signals on 4765
0510 hrs. G.M.T. Wed May 29th 1957
Many thanks for your information.
J.F. Andrews
Officer for Further Education
ZK1ZA
RADIO RAROTONGA — COOK ISLANDS
Station Information
Frequency 4765 kilocycles
On the air 0450-0520 G.M.T
each Wednesday (Wed G.M.T)
Transmitter: R.C.A. Type
351HF. Output 350 Watts
Antenna : Dipole

Radio amateurs played their part in establishing many of our shortwave services and ZK1ZA at Rarotonga pioneered the present Cook Island Broadcasting Service.

programme magazine. In New Zealand in the early 1920's readers wrote in of the stations they heard. About the same time it also became apparent that a station chart was needed, and from one's own listening and from what official government lists were available, a station chart was compiled and distributed to the buyer of a new radio. He soon became a DX-er, as his radio programming was so poor and uncertain that he tuned the world to find something to his liking. Clubs were established with their own magazine staff, and this seemed to be the pattern in the 1930's in most countries.

While many people listen to radio on both the mediumwave and shortwave bands, few realise the full potential of their receiver and its ability to tune in stations from other countries. In this chapter we take a brief look at 'DX' (or long distance listening) as a hobby and the steps necessary to obtain verification cards.

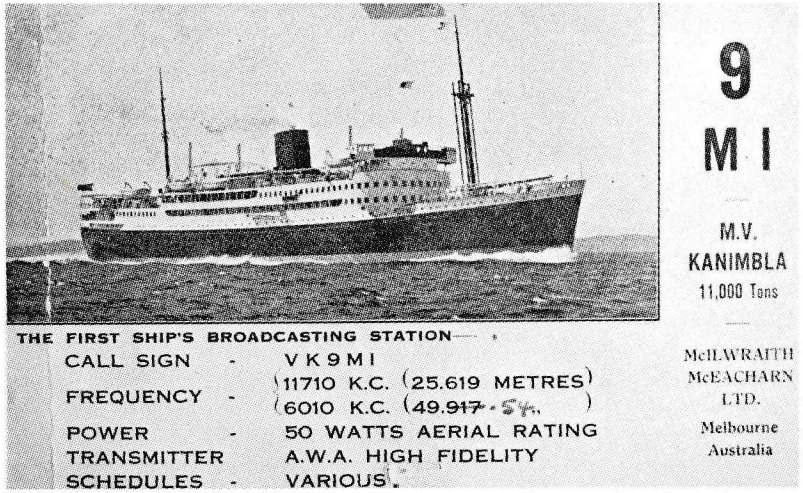
On the mediumwave band, typically between 531kHz and 1602kHz, successful reception of distant stations is largely confined to those hours when the path between transmitter and receiver is in darkness. For this and other reasons the long winter nights offer the best opportunities for interesting mediumwave (or "broadcast" band) DXing.

On the shortwave bands, (particularly above 3MHz, which is below 80 metres,) seasonal factors are much more significant. Reception tends to be at its best during daylight hours in our winter months, but at night during our summer.

Over a longer term, shortwave listening conditions are affected by the degree of sunspot activity on the surface of the sun—an activity which affects the reflective properties of the ionospheric layers fringing the earth's atmosphere. Sunspot activity conforms to an approximately 11-year cycle and we are presently near the peak of the cycle. Currently, propagation conditions are such that shortwave stations are tending to favour the higher frequencies.

Various other factors disturb shortwave listening conditions from time to time, including auroral effects and the more localised atmospheric conditions. And, of course, there are always the hazards of man-made interference from electrical appliances, power lines (particularly under dry, dusty conditions), and even nearby TV receivers; such interference can blot out signals which would otherwise be strong enough to be received clearly.

So while shortwave reception tends to follow certain patterns, the DX hobbyist should always be prepared for surprises—pleasant and otherwise!



An Australian vessel, the Kanimbla, was world famous for its broadcasts as 9MI of musical programmes when off the coast of Australia, and though it had the power of only 50 watts, it was heard in many parts of the world.

An isolated area of the world is heard from time to time when radio amateurs set up a special station to add another country for their fellow hams to contact. This photo is of a verification of VR3A on Washington Island, Central Pacific.

Shortwave Reports: International shortwave broadcasting stations are keen to learn how far their signals have been heard and, of course, to operate on frequencies which ensure world-wide reception at some time of the day.

The international broadcaster is keen to know five things: the time of the reception in GMT; the date; the frequency in use; details on the signal strength; and information about 15 minutes of programme material. Stations broadcasting world-wide operate mainly from 49 metres down to 13 metres in the various international bands.

There are also many stations, particularly in Africa and South America, which operate in what is known as the tropical bands and which are designed for local and regional reception. Long distance reception of these transmissions is of great interest as it gives the stations some idea of the distance over which their signals can be heard.

In the case of transmissions from Africa, French and English reports are submitted, while Indonesian stations welcome reports in Indonesian, and South American (except for Brazil) reports should be in Spanish. DX clubs have report forms and guides in these languages to enable the listener to compile a letter so that it can be

understood by the station. It should be realized that when writing to small stations in foreign countries there may be no one on the staff who understands English.

If there is interference, the listener can best help the shortwave station by identifying the signal causing the interference on the channel.

Stations also appreciate comparisons of their signals with those of other countries broadcasting from the same area. This helps them to evaluate their audience and to learn if their competitors are providing listeners with a clearer signal.

It should be remembered when sending a reception report, for example for Radio Nederland, that the signal may not necessarily be coming from Holland—it could be from Bonaire or Madagascar, two of Radio Nederland's relay stations. This is also the case for the BBC, Voice of America and Deutsche Welle, as well as other broadcasters who have built facilities nearer to the primary audience.

Another example in this part of the world is the BBC relay base in Singapore, enabling reception at night during winter which would not be possible if the signal was direct from London. Listeners

A selection of verification cards from both mediumwave and shortwave stations show the variety of interesting QSL's one can receive.

Many stations particularly in South America not only verify reception with a card or letter but also send attractive pennants in appreciation of reception reports.

should therefore listen for station announcements, generally given on the hour, as to the source of the transmission.

To help the new listener obtain as many verifications as possible, a list of the major services to this area is given later. For those seeking further information, the "World Radio and Television Handbook" gives complete details on every radio and television station in the world.

It should be emphasised that your report must be attractively presented, look interesting to the station, and easy to follow. Finally, there should not be a demand on the station to confirm reception, but rather a polite request that they verify if the report is of value. This they can do by checking the station's broadcasting log.

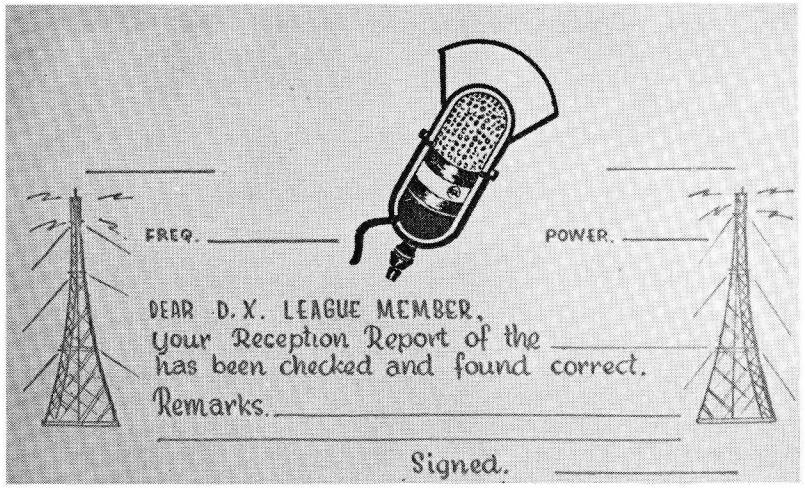
Reception Report Forms: Many DX Clubs have report forms available for members. The listener merely has to fill in the appropriate parts to complete the form, which is then posted. Alternatively, the forms may be printed on an aerogram.

Prompt dispatch of your report is vital, otherwise conditions on

the frequency could change before your letter reaches the station.

The report form contains space for the station address on the top left—and your address on the top right. Then there is provision to fill in the frequency, date, and time of reception. It is advisable to spell out the day and month, as confusion can result if you use only figures. For example, in the United States and some other countries, when the date is written in figures the month is printed before the day; so 12.6.80 would be the 6th of December 1980, and not the 12th of June 1980 as it would mean in New Zealand. Space on the form is provided for programme details. Remember to give positive and verifiable material in your report, and specify the names of items or describe what was broadcast as fully as possible. The report form concludes with provision for details on the receiver (describe the model, type, and number of valves or transistors etc.) and the aerial in use (e.g. inverted L, dipole, etc.) Also include information on the signal condition and your location.

Always put your name and address on the back of the envelope so that if it is undelivered your report will be returned to you. As a rule it is not wise to put commemorative stamps on letters to some countries because many prettily-stamped letters never reach the station. Address your report to the Manager of the station or, if it is a large



Prepared cards are often used by listeners when a station fails to reply to the first report. This makes it easy for station personnel to confirm reception as they have to check only the log and sign the card which has mint stamps attached.

one, to the Chief Engineer. In the case of an international station, address the report to the appropriate department, e.g. English Section, or Propagation Section, or the Far East Service.

It can therefore be seen that one of the most interesting aspects of radio listening is receiving verifications from various stations throughout the world as a result of sending reception reports to them. Verifications are the basis on which most listeners judge their success in DXing.

To ensure a reply to your report, enclose return postage in the form of International Reply Coupons (obtainable from the Post Office) or mint stamps from the relevant country (often sold to members by various DX clubs). Some stations are commercially operated and show appreciation of help with return postage.

Example:

Mr John Smith,
67 Glenalmond Crescent,
Invercargill,
NEW ZEALAND

23 March 1980

The Chief Engineer,
The Voice of Chile,
Casilla 244V,
Santiago,
CHILE.

Dear Sir,

I have noted the use of your new 16 metre-band frequency of 17712kHz and heard at 2100 hours GMT. My reception was of Sunday, 23 March, 1980 and at that time your signal was heard with a fair strength and fair readability, but some side-band interference from the Voice of America on 17710kHz. This time of reception and the frequency in use is ideal for signals to this part of the world, and I also presume to Europe, but your closeness to VOA only 2kHz away may cause some listening problems to listeners whose receivers are not very selective. Here are some details concerning my reception on 17712kHz.

GMT SUNDAY 23 MARCH 1980 Santiago 17712kHz

2100 Full opening announcement "This is the Voice of Chile, Santiago, broadcasting in English on the 49, 31, 25 and 19 metre-bands" . . . theme.

2105 English news bulletin including information about the expansion of radio transport in Chile . . . comment on a visiting ballet company . . . details on the new Chilean Air Services . . .

2109 "This is the Voice of Chile, broadcasting from Santiago, Chile. Our address is Box 244V, Santiago, Chile" ... lady speaker ... music ... Chilean music, Spanish numbers "Tico, Tico", Tango (no vocal)

2115 Announcement and programme in Spanish

2155 Returned to the frequency programme in Arabic.

The signals are suffering slight side-band interference from VOA on 17710kHz. Your frequency 17712kHz is a fair signal, SINPO 32332 with fair readability. The receiver is a Hallicrafters 12 tube, and the antenna a long wire, 60m long, 17m high bearing North/East.

Thank you for confirming this report on transmissions on 17712kHz. Your present broadcasting schedule and frequencies would be much appreciated as also information on the power of the transmitters that you are now using. I have enclosed IRC's for return postage.

Yours sincerely,

JOHN SMITH

INTERVAL SIGNALS—THE BEST GUIDE TO IDENTIFICATION

While a knowledge of foreign languages helps in the identification of stations, the interval signals used by many international broadcasters are often a better guide to identification of the broadcasts.

The language used in a particular transmission by a shortwave station is not always a reliable guide to the whereabouts of the station, or as an aid to identification. It is the interval signal which provides a more positive means of identifying an unknown station.

UNION POSTALE UNIVERSELLE
COUPON-RÉPONSE INTERNATIONAL
C 22
Ce coupon est échangeable dans tous les pays de l'Union postale universelle contre un ou plusieurs timbres-poste représentant l'affranchissement minimal d'une lettre ordinaire, expédiée à l'étranger par voie de surface.
Empreinte de contrôle du pays d'origine (date d'oblitération)
Prix de vente (indication facultative)
140 円
Timbre du bureau qui effectue l'échange
SAKAI OSAKA -3.VIII.77-12-18 JAPAN

The International Reply Coupon which is obtainable from the Post Office enables the listener to provide return postage with his reception report, as the coupons can be exchanged overseas for the postage required for the reply.

The interval signal is usually associated with some characteristic of the country concerned, in either its music, a wildlife source or some other sound peculiar to the region from which the broadcast originates, so it provides a ready clue to the station's whereabouts.

A knowledge of these identification signals is of great assistance when a shortwave station is to be identified. For instance, if you hear the song of the bellbird you are tuned to Radio New Zealand; or if it is the sound of the kookaburra or the strains of "Waltzing Matilda" you would immediately know the station is Radio Australia.

While it is obviously impracticable to provide a complete listing of interval signals, here are some of those commonly heard.

In the past, the BBC World Service has used the chimes of Bow Bells but this was recently replaced by an orchestral version of "Bells of St Clement's". Radio Netherland uses the carillon of the St Jan's Cathedral, Hertogenbosch. Radio Moscow has the Kremlin Bells as one of four interval signals used in its overseas services. Vatican Radio with the Bells of St Peter's is easy to identify. Bird calls are popular, and besides the bellbird for New Zealand and the

kookaburra from Australia, the nightingale is used by Italy; New Caledonia has the call of the cagou bird, and South Africa uses the call of the bokmakierie bird.

"Swedish Rhapsody" helps to tell listeners they are tuned to Stockholm and a familiar Chopin polonaise identifies programmes from Poland. Music boxes are popular and these are used by Switzerland, Norway, Monte Carlo and several stations in Japan. The first few bars of a country's national anthem also form identification signals; "O Canada" is used from Montreal. Clock chimes, too, identify and are used by Moscow and Cairo. Big Ben tells the listener he is tuned to London. Another well-known BBC signal, used in the service to Europe, is the morse code "V" (...-), so much associated with World War II. Native drums would immediately indicate somewhere in the tropics, and the listener could be tuned to Radio Tahiti or any of the numerous stations in Africa.

The Gospel stations use a few bars of a hymn to identify their programmes; the BBC Regional Services use the musical notes "b" "b" "c" to identify that programme; the United States can be recognised by "Yankee Doodle", and one Moscow transmission by the well-known number "Midnight in Moscow".

REPORTING CODES

To aid international broadcasters evaluate their signals quickly, a system of codes has been devised which cover the main fields of interest to the station in evaluating a signal as received by the listener.The SINPO code is widely used for this purpose as each letter denotes a certain reference to the signal, while the final figure gives the overall picture of the broadcast transmission. The code is made up of S for signal, I for interference, N for noise, P for propagation and O for overall merit, and is based on 5 for perfect conditions in all categories down to O as unusable and of no value. The SINPO code is as follows:

SIGNAL	INTERFERENCE
5 Excellent	5 Nil
4 Good	4 Slight
3 Fair	3 Moderate
2 Poor	2 Severe
1 Barely audible	1 Extreme

NOISE	PROPAGATION	OVERALL MERIT
5 Nil	5 Nil	5 Excellent
4 Slight	4 Slight	4 Good
3 Moderate	3 Moderate	3 Fair
2 Severe	2 Severe	2 Poor
1 Extreme	1 Extreme	1 Unusable

To use this code the five sections are put together so that five figures are shown when considering the reception quality of a broadcast. If this reception was perfect, — and this would only occur on a local station—, the figures would be 55555. Broadcasters do not agree that such reception is possible, except on only very rare occasions. In fact over recent months, the BBC and some other international stations have expressed interest only in signals with a range of 2-4 in the numbers used. They maintain that any signal over 4 is a bonus and that any signal less than 2 in the overall merit is of no value to the listener.

To give some examples in using this code, a station which the listener analyses as 43443 shows that the signal is good; interference is moderate and possibly from a station of the same frequency; noise is slight; propagation conditions are slightly below normal and the overall merit of the signal is fair. It should always be remembered that the last figure must be equal to the lowest figure used in the group and a signal could never be 24344, as both the signal level and the noise are below normal yet the final picture of the signal indicated by figure 4 at the end of the group shows the broadcast as being received at good overall strength. This code presented to the station is self-contradictory because we say that the signal was only weak and that the transmission also suffered from noise.

One of the most difficult values to assess is propagation and the listener may find it takes long experience in listening to shortwave to realize that a disturbance is about to happen, or has happened and that the usual transmissions heard at a given time are received at poorer strength and are subject to flutter and fading. In fact some codes replace the letter P for propagation with F for fading and use the same system of reference. This is claimed to be easier to estimate the signal performance as, in the case of fading, the receiver equipped with an S-meter will give a visual indication that the signal is not stable.

The SIO Code: More recently the SINPO code has been replaced by a much simpler evaluation code, the SIO code, which is now standard with the BBC, CBC, VOA, Radio Nederland and other broadcasters and is used exclusively by monitors in reporting reception of these transmissions. The SIO code is as follows:

SIGNAL	INTERFERENCE	OVERALL MERIT
5 Very Strong	5 Nil	5 Excellent
4 Strong	4 Slight	4 Good
3 Fair	3 Moderate	3 Fair
2 Poor	2 Severe	2 Poor
1 Barely audible	1 Very severe	1 Unusable

Interval signals help listeners identify shortwave stations, and the Kookaburra is known world-wide as the opening call of Radio Australia.

TERMS USED IN REPORTING

ADR	address
ANT	antenna, aerial
CW	continuous wave
DX	distance, long-distant radio reception or tranmission
GND	ground
HI	high; the DX expression of self derision
ID, IDENT	identification
NR	number
OM	old man
PWR	power
RCD	received
RX	receiver
SIG	signal
SWL	shortwave listener
TNX	thanks
TVI	television interference
WX	weather
TX	transmitter
XTAL	crystal
73	best regards
88	love and kisses
AEST	Austalian Eastern Standard Time
NZST	New Zealand Standard Time
NZDT	New Zealand Daylight Time ("Daylight Saving")
AM	Amplitude Modulation
bandwidth	part of the spectrum which is allowed to pass
carrier frequency	frequency mentioned in station announcement, it is the frequency on which the audio signal "rides"
CET	Central European Time
EST	Eastern Standard Time
FM	Frequency Modulation
GMT	Greenwich Mean Time
ham station	amateur radio station
heterodyne	high pitched whistle resulting from two carriers within the passband of a receiver
identification	station announcement or signal
interference	the reception of the desired station is hindered by another signal
IRC	International Reply Coupon
kHz	kilohertz — 1,000 hertz = 1,000 cycles per second
local time	the hour at the receiving station
MHz	Megahertz; 1,000,000Hz 1,000,000 cycles per second

Compiled by Jim Vastenhoud, (Radio Nederland)

DX CLUBS OF AUSTRALASIA

This list of DX Clubs in Australia and New Zealand gives details of the headquarters address, the name of the publication and the address of the various branches or contacts. These clubs have groups

in other parts of the country which meet monthly, while the contacts shown are of personal help to newcomers to the hobby.

AUSTRALIA:

AUSTRALIAN RADIO DX CLUB; Headquarters, P.O. Box 227, Box Hill, Victoria, Australia 3128.
Publication: Australian Radio DX News.
Editor: Peter Bunn, P.O. Box 227, Box Hill, Victoria, Australia 3128.

DOWN UNDER DX CIRCLE; Headquarters, 7 Donald Road, Burwood, Victoria, Australia 3125.
Publication: Down Under DX Survey.
Editor: David Foster, 7 Donald Road, Burwood, Victoria, 3125.

SOUTHERN CROSS DX CLUB; Headquarters, GPO 336, Adelaide, South Australia 5001.
Publication: DX Post
Editor: Keith Barton, GPO 336, Adelaide 5001.

Branches:

Adelaide: Rex Gillett, 22 Cooper Place, Beaumont, South Australia 5066.
Sydney: Jack Buckley, 73 Dolphin Street, Coogee 2037, Australia.
Melbourne: Harry Weatherley, P.O. Box 396, Mt. Waverley, Victoria 3149, Australia.
Brisbane: Ernie Moore, 4 Ashmore Street, Everton Park 4053, Australia.

NEW ZEALAND:

NEW ZEALAND RADIO DX LEAGUE; Headquarters, P.O. Box 1313, Invercargill, New Zealand.
Publication: New Zealand DX Times.
P.O. Box 2956, Wellington, New Zealand.
Stationery Secretary: Ted Sutton, P.O. Box 450, Oamaru, New Zealand.
Public Relations Officer: Arthur Cushen, 212 Earn Street, Invercargill. New Zealand.

Branches and Contacts:

Northland: Lionel Rose, 230 Morningside Road, Whangarei.
Auckland: Bill Huddleston, 10 Nile Road, Glen Eden, Auckland.

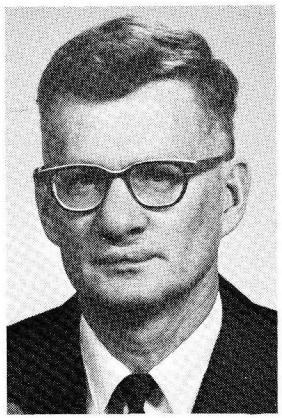
Bay of Plenty: Colin Campbell, 6 Clouston Crescent, Rotorua.
Waikato: Jim Benzoni, Library Section, University of Waikato, Hamilton.
Hawkes Bay: Jack Searle, 2 Shrimpton Road, Haumoana, Hawkes Bay.
Taranaki: Robin Chambers, Te Naru Road, No. 3 R.D., Opunake.
Wanganui: Phillip Brooks, Mosston Road, Wanganui.
Palmerston North: Lee Morris, 14 Kettle Avenue, Palmerston North.
Wellington: John Mainland, 30 Burrows Avenue, Karori, Wellington.
Nelson: Tom Chisnal, 176 Waimea Road, Nelson.
Canterbury: Peter Mott, 31 Victors Road, Christchurch 2.
South Canterbury: Craig Strathern, 112 Morgans Road, Timaru.
North Otago: Mrs M. D. Bloxham, Kakanui, 14 R.D. Oamaru.
Otago: Ash Nallawalla, P.O. Box 6159, Dunedin.
Southland: Mrs I. Simpson, P.O. Box 5014, Invercargill.

NEW ZEALAND DX RADIO ASSOCIATION; Headquarters, 40 Craigleith Street, North East Valley, Dunedin.
Publication: Tune In.
Editor: Clive Cumming, 53 Nelson Street, Dunedin.

Branches

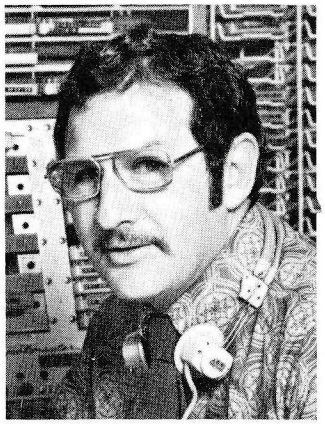
Otago: Ernie Niven, 14 Tedder Street, Dunedin.
Christchurch: Ivan McEwan, 43 Redgrave Street, Hoon Hay, Christchurch.

Frits Greveling, the compere of Radio Nederland's "DX Juke Box".



Clayton Howard who comperes HCJB's DX Party Line.

Arne Skoog who pioneered DX Sessions with "Sweden Calling DXers" which has been broadcast for thirty years.



Warren Moulton, one of the comperes of Radio Australia's "Club Forum" programme.

DX SESSIONS

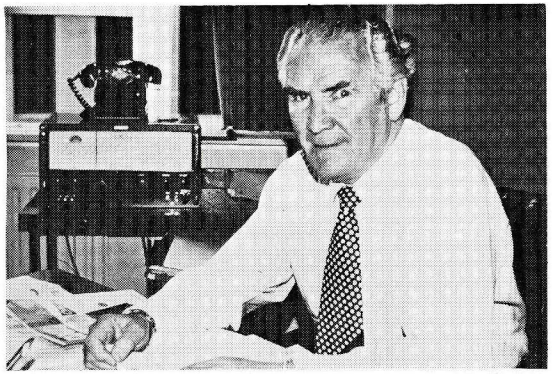
The speed of radio for passing on information has been realized by shortwave listeners everywhere, and over the years there has been a rapid expansion of DX Sessions set up by international broadcasters as a means of serving their listeners. This type of information service is the quickest way to disseminate news of shortwave frequency changes and the DX tips which mean so much to the shortwave listener in keeping him informed of the rapidly changing shortwave scene. Club bulletins play their part in all organizations, but the printed word is always slower than information received by radio. In the DX Session, news of information to shortwave listeners is broadcast, and the stations concerned with these sessions often find it an avenue of providing information on any frequency or schedule change they are about to make.

In February 1948, Arne Skoog of Radio Sweden introduced "Sweden Calling DXers", and this broadcast pioneered the way for many others to follow. It was Australia however, that pioneered the DX Session which was first scheduled in July 1946, but after a run of 31 years, the programme was withdrawn at the end of October 1977, although DX Tips are still contained in the Club Forum programme presented by Keith Glover.

There are more than 25 countries broadcasting regular programmes for the shortwave listener in the form of DX Sessions,

and we list below those best received in New Zealand and broadcast in English.

Location and Programme	GMT and Day	Frequencies
Melbourne, Australia	2040, Fri.	9540, 9580, 11810kHz
"Club Forum"	0840, Sat.	9570, 11740
Vienna, Austria	0900, Sun.	21610
Brussels, Belgium	0045, Mon.	11715, 15175
Montreal, Canada	2020, Sun.	15325
"DX Digest"	0420, Mon.	5960, 9535
Prague, Czechoslovakia	0300, Fri.	9540, 9630
Quito, Ecuador	0900, Mon.	6130, 9745, 11900
"DX Party Line"	0900, Thurs., Sat.	6130, 9745, 11900
Helsinki, Finland	0930, Sat.	21465
London, England	0745, Sun.	7150, 9640, 11955
"BBC World Radio Club"	1115, Mon.	15070, 17790, 21550
Hilversum, Holland	0750, Thur.	9715, 9770
"DX Juke Box"	0850, Thur.	9715
Tel Aviv, Israel	2255, Sat.	9009, 9815, 11655
Tokyo, Japan	1010, Sun.	11875, 15235
Wellington, New Zealand	1015, 1st Sun.	MW 567, 675, 810
"Arthur Cushen's DX World"	1015, 1st Sun.	6105
Bucharest, Romania	0400, Thur., Sat.	9570, 9690, 11735
Colombo, Sri Lanka	1100, Sun.	11835, 15120, 17850
"Radio Monitors International"	1400, Sun.	6075, 9720, 15425
Stockholm, Sweden	1115, Tue.	21690
Berne, Switzerland	0715, Sat.	9560, 21695, 15305
"Swiss SW Merry-Go-Round"	0915, Sat.	9560, 21695, 15305
Moscow, USSR	0832, Tue.	11745, 15130, 21600



Geoffrey Haggett, Overseas Programme Manager of Radio New Zealand who handles the mail sent to the shortwave Service.

CHAPTER ELEVEN

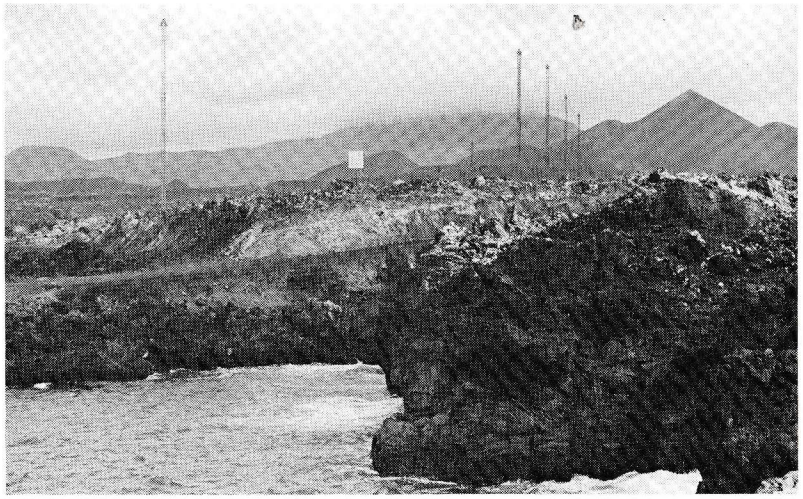
International broadcasting

International broadcasting covers a wide range of stations and in this final chapter I deal with a number of these and also cover some of the interesting programmes that can be heard on shortwave. Not all international stations rely on their programmes being heard world-wide from their own transmitting stations. Relay bases are increasing throughout the world as stations endeavour to set up transmitters in various parts of the globe in order to achieve better coverage. For instance, the Voice of America not only has powerful transmitters on the east and west coasts of the United States but also has relay bases in the Philippines, Sri Lanka, Monrovia, Rhodes, Kavala, Munich, Bangkok and Tangiers, while facilities of the BBC in the United Kingdom are also used.

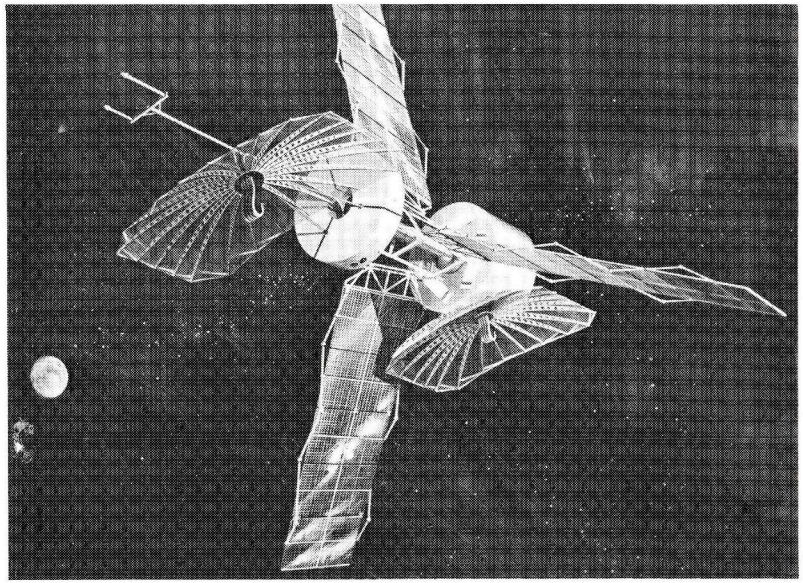
Likewise the BBC has relay bases in Cyprus, Masira Island, Singapore, Ascension, Antigua, Monserrat, as well as using facilities of Radio Canada and the Voice of America. Other stations, such as Deutsche Welle, Trans World Radio, and Far East Broadcasting Company, also have stations in various parts of the world which rebroadcast or carry recorded programmes supplied from the home station.

South Pacific listeners will be aware of Radio Nederland's relay base at Bonaire in the Caribbean which provides us with excellent reception of its transmissions, while another station on Madagascar serves Western Australia, Asia and Africa. Radio Australia, though not operating overseas relay bases, has powerful transmitters at Carnarvon in Western Australia which boosts signals into Asia.

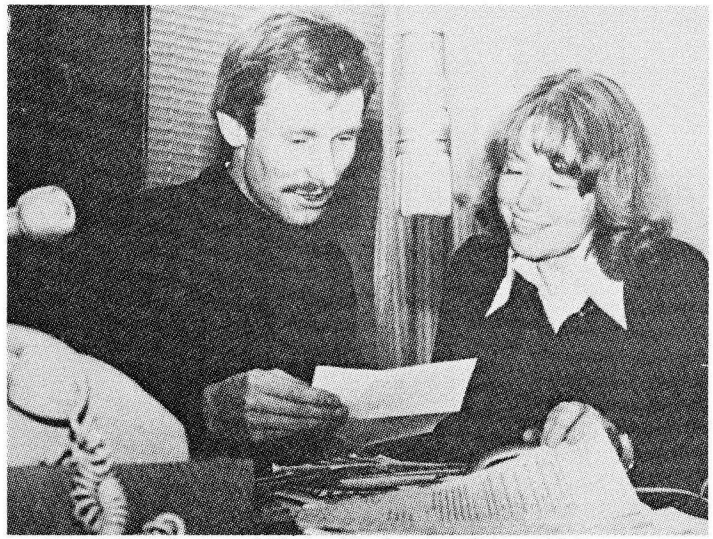
Those who are interested in learning a foreign language will find that many stations have lessons in their own local language and the English equivalent. These language lessons come complete with recording and printed texts from the station, and learning a language by shortwave radio in one's home is a popular means of mass



The BBC relay base on Ascension Island helps provide better signals of programmes from London into South America and Africa.



Satellite links are now employed to link studios with overseas relay bases. This verification was issued by Radio Nederland.



Patrick Humphreys and Marion Wood answer listeners' letters sent to Radio Finland.

education. It is known, for instance, that Radio Australia's Indonesian lessons some years ago were listened to by many thousands of Indonesians who had requested the textbook. There is also aid for those learning the English language from the Voice of America which broadcasts news in slow-speed English, the text of which is made up of only basic English words so that those learning the language will not be faced with difficulties in understanding the broadcast.

ANSWERING YOUR MAIL:

Most international stations have a mailbag session in which letters from listeners are answered on the air, and in these sessions, questions about a country and its people and others of a technical nature are handled by the announcing staff. Praise or criticism of the station programmes is often the subject of letters from listeners answered on the air and, as they come from all parts of the world, these programmes are entertaining as well as providing a personal link between the station and its audience. Almost every station on

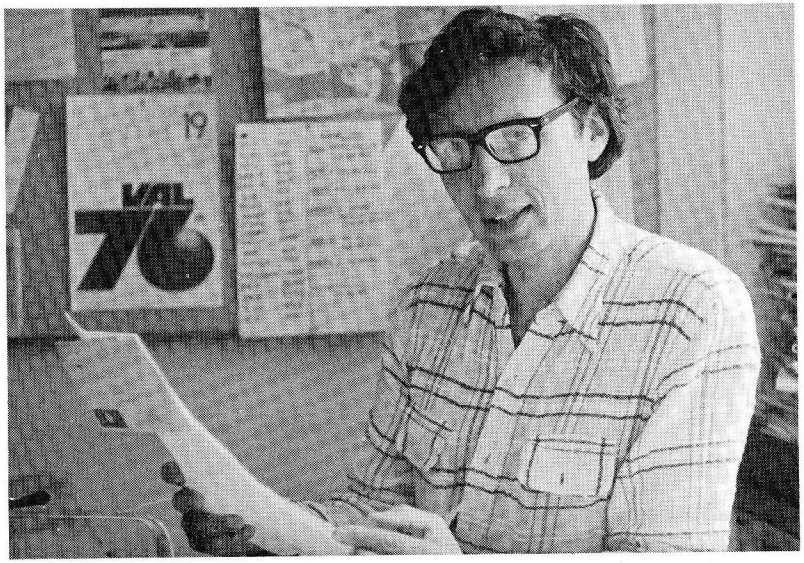
Keith Glover, Radio Australia's Mail Man, answers listeners' letters received in the Melbourne studios.

shortwave has this type of session, but the list below covers those which are of most interest and are heard well in Australasia.

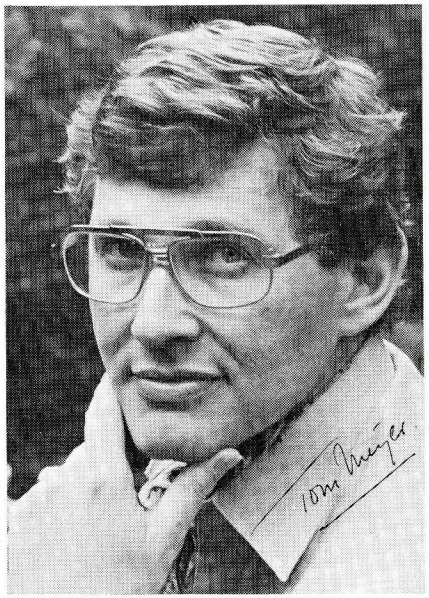
AUSTRIA: "Post Box 700" on Mondays, 0830-0900GMT on 21630kHz.
AUSTRALIA: "Overseas Mailbag" with Keith Glover, Saturdays, 1940GMT on 9580kHz; Sundays 0740GMT on 9570kHz.
CANADA: "Listeners Corner" Sundays, 2015GMT on 15325kHz.
FINLAND: "Letterbox" Sundays, 0930-1000GMT on 21465kHz.
GREAT BRITAIN: "BBC Letterbox" Sundays, 0515GMT on 9410kHz, and 2100GMT on 9410 and 11750kHz.
NEW ZEALAND: "Mailbox" on the third Sunday of each month at 1015GMT on mediumwave, and on shortwave 6105kHz.
SWEDEN: "Listeners Letters" Sundays, 1115GMT on 21690kHz.
SWITZERLAND: "Talk Back" every second Saturday 0710GMT on 9560 and 15305kHz.

GOSPEL BROADCASTING:

The rapid growth of gospel radio is such that stations in all continents are now using shortwave radio to carry the message of the gospel to millions of listeners. This is another aspect of shortwave radio which is giving immense satisfaction to millions of listeners; no



Stanley Bloom, Radio Sweden's Mail Man in Stockholm answers letter.



Tom Meyer who broadcasts "The Happy Station" every Sunday from Radio Nederland took over from the late Edward Startz and this session is now in its 50th year.

longer are missionaries in the field so dependent on personal evangelizing as radio can reach the poorer populations in many underdeveloped countries via cheap transistor radios or group listening, or in some cases, radios are supplied which are pretuned to the gospel station.

ECUADOR: The best known gospel radio station is HCJB in Quito, Ecuador, and the call letters stand for "Heralding Christ Jesus' Blessings". HCJB began in 1931 and now operates around the clock with gospel programmes in many languages and a service to the South Pacific 0700-1130GMT on 6130, 9745 and 11900kHz.

PHILIPPINES: The Far East Broadcasting Company has been broadcasting from Manila for over 30 years and their service to Australia and New Zealand includes a broadcast in English 0800-1000GMT on 11765kHz. Radio Veritas Overseas, a Roman Catholic broadcasting station, has transmissions to Asia and Australasia with English 0100-0200GMT on 15280kHz.

VATICAN: The Vatican Radio has a service to the South Pacific daily 2210-2225GMT on 9615, 11745 and 15120kHz. A programme in

four languages called "Four Voices" is heard at 0700GMT on 6210 and 9645kHz.

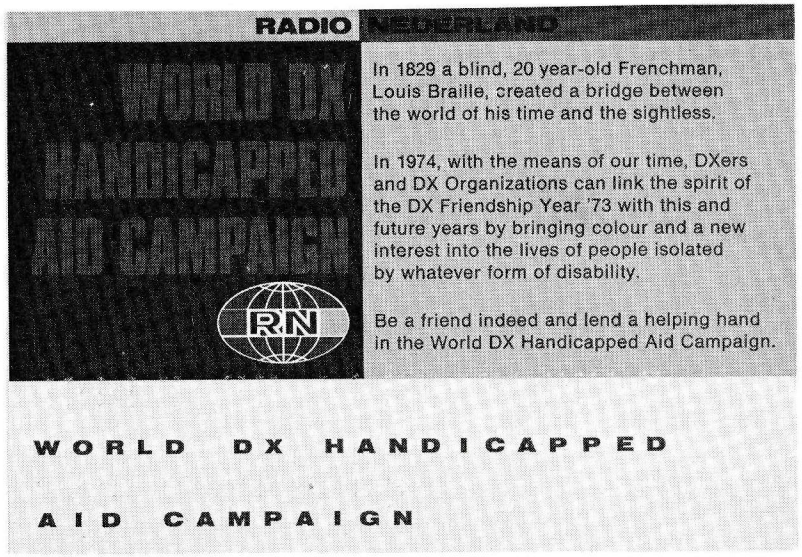
GUAM: Trans World Radio which has stations at Bonaire, Monte Carlo, in Swaziland, Cyprus and Sri Lanka is best received in the transmissions from the new KTWR, Guam. English programmes are at 0800GMT on 15135 and 17855kHz; 1100GMT on 11740 and 15425kHz, and at 2200GMT on 15115 and 17855kHz.

UNITED STATES: Three gospel stations operate from the USA: KGEI, San Francisco, which beams programmes to the Americas and to the Pacific; WYFR which serves Europe and the Americas, as does WINB.

These are only a few of many stations promoting the gospel on shortwave.

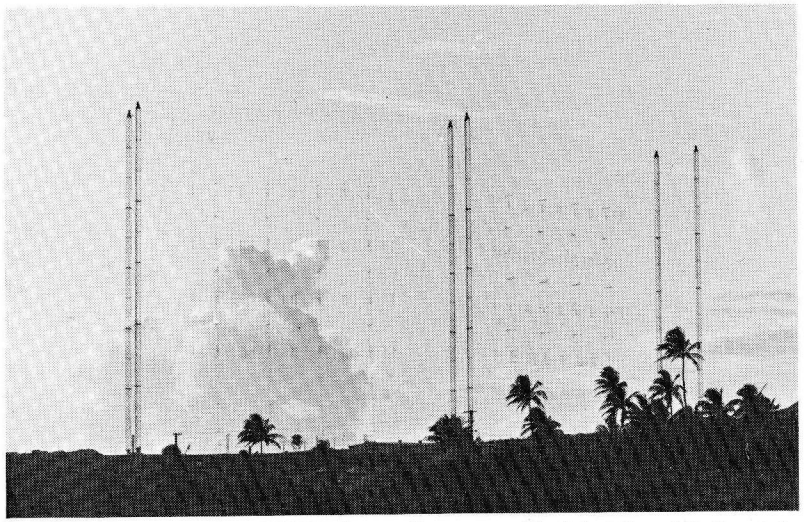
HANDICAPPED LISTENERS:

Shortwave radio is to the handicapped listener who may be shut in owing to physical disability or blindness, his newspaper, television

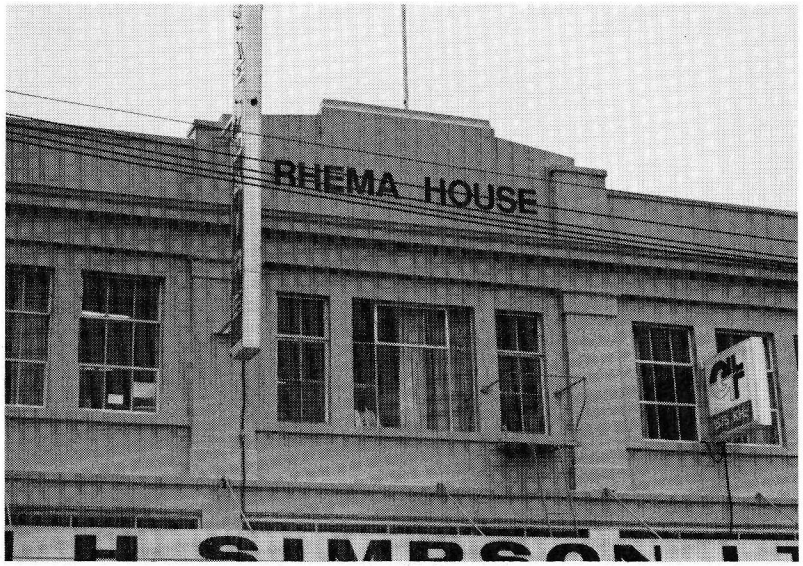

RADIO NEDERLAND
WORLD DX HANDICAPPED AID CAMPAIGN
RN
In 1829 a blind, 20 year-old Frenchman, Louis Braille, created a bridge between the world of his time and the sightless.
In 1974, with the means of our time, DXers and DX Organizations can link the spirit of the DX Friendship Year '73 with this and future years by bringing colour and a new interest into the lives of people isolated by whatever form of disability.
Be a friend indeed and lend a helping hand in the World DX Handicapped Aid Campaign.
WORLD DX HANDICAPPED
AID CAMPAIGN

Handicapped listeners world-wide are being encouraged with their hobby, and in 1973 this special card with print and Braille text was issued by Radio Nederland to promote listening for the disabled.

Dody, Surmantha and Jerry Cowan of Radio Nederlands "His and Hers" programme. The husband and wife team of Jerry and Dody Cowan are popular in their Tuesday broadcasts.



The transmitting complex of KTWR, Agana, Guam, one of the latest Gospel stations to be received well in the South Pacific.

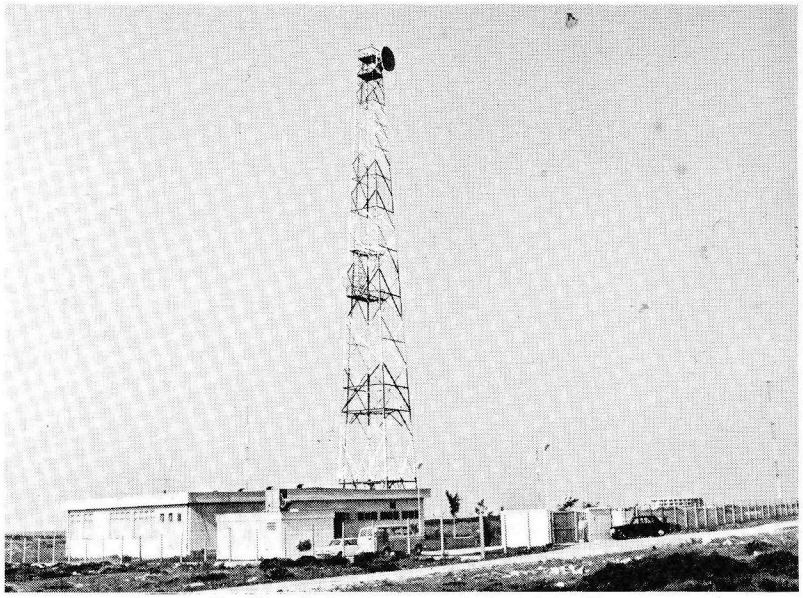


Radio Rhema, New Zealands' first Gospel station has its studios in Christchurch.

and cinema. The whole world's news and entertainment is available to pass away many dreary hours of loneliness and isolation. In 1973 a world-wide programme was launched to help the handicapped listener use his radio to better his knowledge of the world and to give him enjoyment never before thought possible.

There are many cases in Australasia of disabled people having been shown the benefits of shortwave radio by DX Clubs and members, and their gratitude at this opening of a new field of enjoyment has been enthusiastic. Space does not permit elaboration of the many experiences of these listeners, except to say that one Adelaide listener who has the use of only his hands is now a guiding force in showing others just what radio has meant to him. Before he became a listener, many receivers had to be tried to find out the one which he could operate best with the very limited pressure in his hands, and now he has converted many of his disabled friends to the wonders of shortwave listening.

I am conversant with such cases because, being blind, I have devised Braille scales and aids to help in quick location of stations, but 45 years of listening experience enable me now to move along the

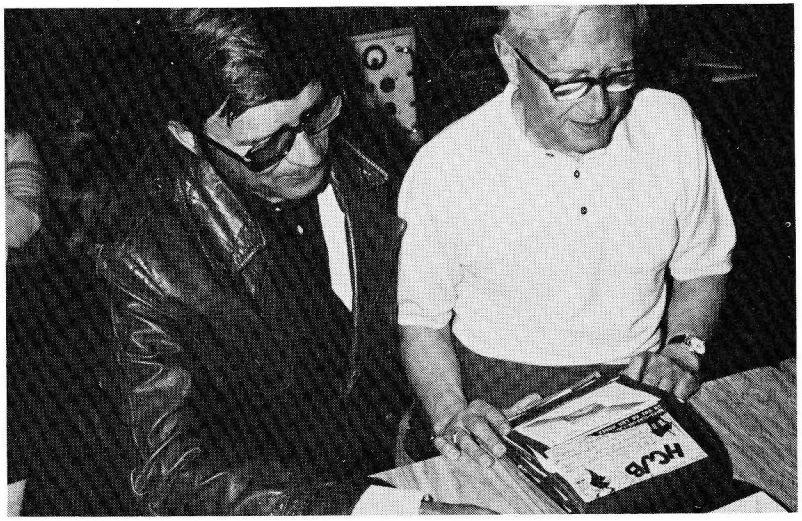


The Adventist World Radio has its transmissions from Sines, Portugal.

dial which is unseen by me, and name the stations as they come through the loudspeaker with accuracy.
Being able to identify around 30 languages makes for ease in station identification. By the use of crystals incorporated in the receiver which give a tone on every 25 and 100kHz as I move along the dial, frequency measurement is made easy, and with the advent of digital read-out receivers which can be converted to audible or tactile operation, it is now possible to know within one kiloHertz the place on the radio dial.

RADIO REGULATIONS:

In the course of listening around the world the new enthusiast will come across stations which are broadcasting point-to-point messages which are of a confidential nature. Such could be from a ship at sea with a telephone call to someone ashore and, though these are normally scrambled, open transmission is sometimes broadcast and the new listener can eavesdrop on the conversation. The Radio



Craig Cook, Vice President and Executive Director of HCJB Quito, Ecuador, looks at some early verifications received from the station.

Mail from all over the world is often a problem for the international broadcaster, and here a member of Radio Denmark staff faces the postman's latest delivery.

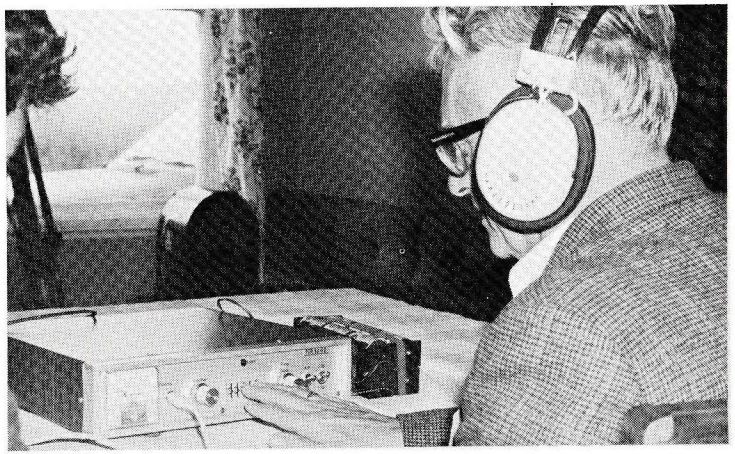
Regulations in most countries prohibit the passing on of this type of information by a third party. It should therefore be realized that the interception of broadcasts which are not intended for public listening should be taken with some restraint and the information heard in such a transmission must not be made public.

There are exceptions of course, when distress calls and Civil Defence emergency messages are heard, and any request for help must be passed on to the local authorities.

ENGLISH NEWS AROUND THE CLOCK

The selection of times and frequencies of news in English is from my observations of the most suitable transmissions beamed to Australasia giving good reception in this area. In this list of more than 100 news-times stations from all continents are listed,and observations are valid from May 6, 1979.

GMT	LOCATION	FREQUENCIES (kHz)
1800	London	9410, 11750, 15070
1800	Melbourne	9505
1800	Wellington	11960, 15345
1900	Teheran	9022
1900	Helsinki	15260
1900	Moscow	5980
1900	Delhi	11620
2000	London	9410, 11750
2000	Delhi	9912, 15160
2000	Melbourne	9580
2000	Pyongyang	9410
2000	Wellington	11960, 15345
2000	Tel Aviv	9009, 9815
2030	Madrid	6140, 9505, 11840
2030	Hilversum	21640
2045	Delhi	9535, 9912, 11740
2100	Cologne	7130, 9765
2100	Washington	15410, 17870
2115	Athens	6140, 9655, 9760
2130	Hilversum	9715
2130	Ankara	7170, 7270, 9515, 9665
2200	Washington	17820, 21610
2200	Santiago	15135, 17712
2200	Melbourne	15160, 15240
2200	Rome	9710, 11905
2200	London	9410, 9570
2200	Washington	15430
2300	London	11750, 15260
2300	Washington	17820, 21610
2300	Tokyo	17755
2300	Melbourne	15240
0000	London	9410, 11750



Receivers with read-out facilities are now common, but this special receiver designed for a blind listener enables him through the use of tactile symbols, to read by touch the frequency down to 1kHz.

The BBC News room at Bush House, London, where over one million words a day are written. Since this photograph was taken, the staff have moved into new modern offices.

0000	Wellington	15345, 17860
0100	Washington	17760
0100	Melbourne	17790
0100	Manila	21515
0130	Madrid	9630, 11880
0200	Montreal	9535
0200	London	9410, 11750
0230	Karachi	17830, 21590
0300	London	9410
0300	Moscow	6175, 7205, 7440
0400	Montreal	5960, 9535
0400	London	9410, 9915
0400	Melbourne	15240, 15320, 17795
0430	Sofia	9765
0500	London	9410, 9580
0500	Tel Aviv	9835, 11655
0600	Johannesburg	17780
0600	Moscow	7195, 9450, 11745, 15130
0600	London	7150, 9640
0600	Wellington	6105, 15345
0630	Warsaw	7270, 9675
0645	Berlin	21465
0645	Bucharest	11940, 17785
0700	Melbourne	9570, 11740
0700	Tokyo	9505, 17880
0700	London	9640, 11955
0700	Tirana	11985
0700	Berne	9560, 11780
0730	Hilversum	9715, 9770
0730	Prague	11855, 17775, 21700
0800	London	9640, 11955
0800	Moscow	11745, 15130, 17880
0830	Prague	11855, 17775, 21700
0830	Hilversum	9715
0830	Vienna	21610, 21735
0830	Peking	11720, 15050
0900	Berne	9560, 11780
0900	Moscow	11745, 15130, 17700
0900	London	9640, 11750, 15070
0900	Tokyo	9505, 17795
0930	Helsinki	21495
0930	Tokyo	11875, 15235
0930	Cologne	9650, 11850
1000	Delhi	15205
1000	Seoul	9525, 9580
1000	Wellington	6105
1000	Moscow	11740, 15110, 17700
1000	Hanoi	10040
1030	Colombo	11835, 15120
1030	Budapest	15160, 17715
1100	Karachi	17665, 21655
1100	Stockholm	21690
1100	Washington	5955, 9730
1100	London	15070, 21550
1200	Melbourne	5995, 6080
1200	Berlin	21465

1200	Washington	5955, 9730
1200	Moscow	11755, 15135, 21615
1300	London	9740, 11750
1300	Washington	9730
1300	Melbourne	5995, 6080
1330	Hilversum	9895, 11930
1400	Moscow	11745, 15135, 17880
1400	London	12095, 15070
1400	Prague	7345, 11990
1430	Hilversum	17855, 21480
1500	Melbourne	5995, 6080
1600	London	9410, 12095
1600	Moscow	7420, 9565, 11700
1700	Paris	9560, 11705
1700	London	9410, 12095

Good Listening!

Arthur Cushen

Harry van Gelder, the pioneer of "DX Juke Box" over Radio Nederland and the promoter of the Handicapped Aid programme.

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Arthur Cushen has been a serious listener to the world of radio since his early teens. Due to very poor eye-sight he took up the DX hobby, and now, because of an almost complete loss of sight, this hobby of DX, ("DX" is an old telegraphic abbreviation for "distance"), has been turned into full-time employment in a field never before attempted by the blind. He is unique throughout the world as a blind person employed in three fields—as a station representative, broadcaster and journalist.

In the field of station representation he has been the Technical Monitor in New Zealand for the BBC, London, since 1942; Radio Canada, Montreal, since 1945, and the Voice of America since 1972. He also represents Radio Nederland, Radio Sweden and the Vatican Radio, and in all cases supplies these organisations with daily checks of their signals. In the field of broadcasting he has been heard on Radio New Zealand on its medium and shortwave services since 1960 in his "DX World" feature, and on the "DX Jukebox" over Radio Nederland on the first Thursday of each month since 1966. He has been a contributor to several large publications and his features in the "New Zealand Listener" and "Electronics Australia" have been presented continuously since 1951. He has also been the shortwave feature writer for the "New Zealand DX Times" and its predecessor publication since 1939, and has run a monthly column on shortwave reception and station news which has been reprinted and used widely thoughout the world by other broadcasters. He is a life member of the New Zealand Radio DX League and is the League's Public Relations Officer. His world-wide involvement as a DX radio listener enables him to help many new listeners, including handicapped people, to enjoy shortwave listening, the result being that his mail totals around 4,000 letters each year.

In the area of work for the blind he has been National Vice-President of the New Zealand Association of the Blind for many years. In 1969 he toured North America, Europe and Africa with his wife, Ralda Cushen, visiting and interviewing key personalities in the broadcasting industry. In 1970 he was awarded the M.B.E. (Member of the Most Excellent Order of the British Empire), and this was presented to him personally by Her Majesty the Queen in Wellington. In his radio listening he has confirmed the reception of over 2,300 mediumwave and 4,500 shortwave stations throughout the world from over 240 countries, which in itself is an achievement of which he is justly proud.

The author's involvement in DX radio, dating from the earliest days of radio broadcasting, is the basis of this book. Additional chapters cover his practical advice on the aspects of radio listening about which an increasing number of listeners throughout the world have been writing to him.